

AFRICENERGY AND INFRASTRUCTURE LIMITED

**ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT OF THE PROPOSED
2.5MMSCFD COMPRESSED NATURAL GAS (CNG) PLANT AT IKOT
OBIOOFFIONG, IBESIKPO ASUTAN L.G.A, AKWA IBOM STATE**

SUBMITTED BY:

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TO:

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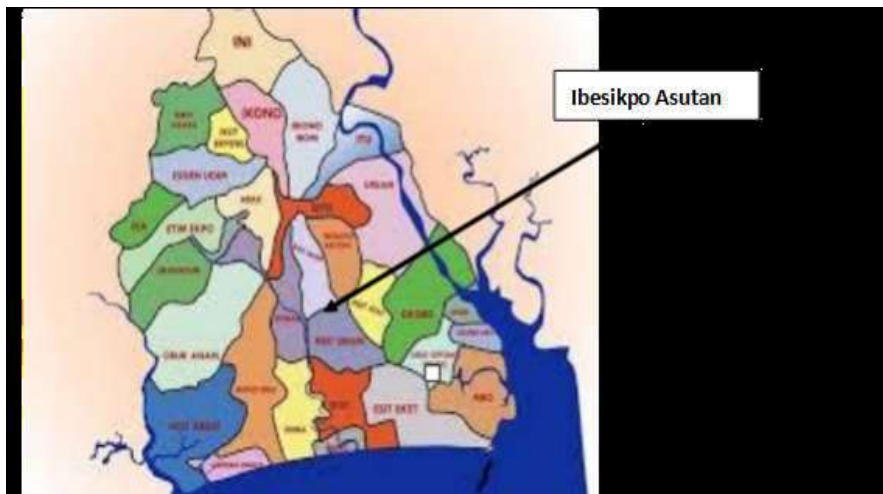
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EXECUTIVE SUMMARY

PROJECT OVERVIEW

AfricEnergy and Infrastructure Limited (the Proponent) proposes to construct and operate a 2.5 Million Standard Cubic Feet per Day (MMSCFD) Compressed Natural Gas (CNG) Mother Station at Ikot Obio Offiong Community, Ibesikpo Asutan Local Government Area, Akwa Ibom State, Nigeria. The facility will receive wet natural gas from the Savanna pipeline via an existing 8-inch lean gas header operating at approximately 250 bar, process it through compression, dehydration, and storage systems, and dispense CNG at 3,260–3,600 psig to daughter station tube trailers and industrial consumers. The plant will operate on a continuous 24-hour basis, 365 days per year, with a design life of 25 years.

The project is strategically important as it converts currently flared and vented gas into a productive energy commodity, directly addressing Nigeria's gas monetisation objectives under the Petroleum Industry Act (PIA) 2021 and the National Gas Expansion Programme (NGEP), reducing greenhouse gas emissions, and providing a reliable, cleaner alternative to liquid fuels for commercial and industrial consumers in Akwa Ibom State and the broader South-South region.



Map 1: Akwa Ibom State LGA Administrative Map — Ibesikpo Asutan LGA (indicated by arrow)



Plate ES-1: Aerial view of a comparable CNG Mother Station — multi-stage compressor skids, high-pressure cascade storage banks, and loading manifolds

PURPOSE AND LEGAL BASIS OF THE EIA

This Full Environmental Impact Assessment (EIA) Report has been prepared by AfricEnergy and Infrastructure Limited pursuant to:

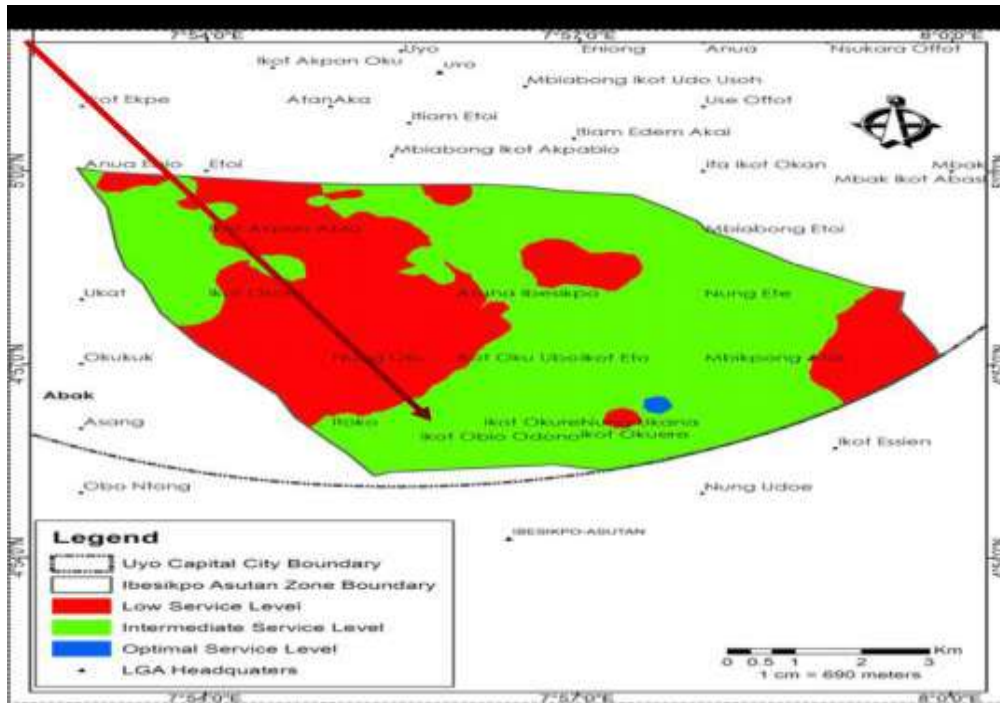
- Section 2(1) of the Environmental Impact Assessment Act CAP E12 LFN 2004, which mandates EIA for projects likely to have significant environmental effects
- The EIA Sectoral Guidelines for Oil and Gas Projects issued by the Federal Ministry of Environment (FMEEnv)
- The Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) Environmental Regulations and CNG Code of Practice (2020)
- The NESREA Act 2007 and applicable National Environmental Regulations
- IFC Performance Standards 1–6 and 8 (2012), Equator Principles IV (Category A), and African Development Bank (AfDB) Environmental and Social Assessment Procedures (ESAP)

This EIA is built directly in accordance with the **Environmental & Social Impact Assessment (ESIA) for Phase III of the Energizing Education Programme (2022)** conducted by the **Federal Ministry of Environment (2022) for Savanna Pipeline** and the Environmental Data collected from the proposed 2.5 mm SCFD CNG plant on 29th–30th April 2026 by Quatenary International Company Limited, and the five-step impact assessment methodology.

STUDY AREA

The EIA study area is defined across four concentric zones:

- Zone of Direct Impact (ZDI): 0–500 m from the facility boundary — encompassing the Ikot Obio Offiong host community and the immediate physical footprint (~4,000 m² direct project footprint within the ~2.5 ha site)
- Zone of Influence (ZOI): 500 m–2 km — covering air quality dispersion, noise attenuation, and hydrological catchment effects
- Regional Study Area (RSA): 2–5 km — for socioeconomic, ecological, and cumulative impact assessment
- Hazard Zone: defined by QRA individual risk contours at 1×10^{-5} /yr and 1×10^{-6} /yr extending from the high-pressure process area



Map 2: Ibesikpo Asutan LGA Service Level Map — Low Service Level (red), Intermediate (green), Optimal (blue). Site located at Ikot Obio Offiong (blue dot). Scale: 1 cm = 690 m

KEY ENVIRONMENTAL AND SOCIAL FINDINGS

PHYSICAL ENVIRONMENT

The project site at Ikot Obio Offiong lies within a peri-urban, light-industrial zone characterised by degraded secondary vegetation. Air quality monitoring at all 13 on-site stations (AQ1–AQ13) received a "NO POLLUTION" designation from NMDPRA. SPM_{10} averaged $2.31 \mu g/m^3$ — 85% below the 2022 EIA baseline — with no methane, SO_2 , or BTEX detected. Site groundwater (GW1–GW3, GWC1) showed pH 7.01–7.08, EC 21.80–25.48 $\mu S/cm$, DO 6.8–6.9 mg/L, BOD_5 3.2–4.6 mg/L — all within NMDPRA/FMEnv limits, with all heavy metals and TPH below detection limits, confirming a clean baseline. No designated protected areas, critical natural habitats, or internationally significant biodiversity sites have been identified within the 5 km study area.

BIOLOGICAL ENVIRONMENT

The site vegetation is classified as bush fallow (*Chromolaena odorata* dominant) — degraded secondary scrubland with no A-storey emergent trees. Total species enumerated in the study area:

47 mammalian species, 78 bird species, and 20 reptile species (PERA field survey). No IUCN Red List threatened species and no IFC PS6 Critical Habitats were recorded within the 4,000 m² direct project footprint.

SOCIOECONOMIC ENVIRONMENT

The host community (Ikot Obio Offiong) has an estimated population of approximately 8,400 persons across three communities. Key baseline findings from the PERA socioeconomic survey (100 households):

- Education: 23.3% completed secondary; 4.2% completed tertiary; 10.8% have no formal education
- Primary occupation: farming (28.6%), informal/not formally employed (49.0%)
- Income: 37% of households earn below ₦88,000/year; 68% earn below ₦164,000/year — below national poverty benchmarks
- Housing: 70% rated 'fairly good'; predominantly block construction with corrugated iron roofing
- Health burden: malaria (51% of all disease cases), diarrhoea/gastroenteritis (14.6%), cholera (8%), typhoid (7.5%)
- Infrastructure: 17 schools (18,898 pupils), 11 health facilities, 10 operational private boreholes
- Community attitude: ~68% support or neutral; 18% concerned about safety; 14% about noise/traffic

SIGNIFICANT IMPACTS IDENTIFIED

The impact assessment, applying a modified Leopold Matrix and the five-step severity assessment methodology, identified the following potentially significant impacts:

- Air Quality: NO_x and particulate emissions from compressor gas engines and diesel generators; fugitive methane from system flanges and valves

- Noise: Reciprocating compressors and generators during operations may exceed FMEnv residential limits without acoustic mitigation
- Groundwater: Risk of contamination from condensate spills, lubricant leakage, and produced water without proper bunding and containment
- Major Accident Hazards: High-pressure gas system (up to 4,350 psig) presents individual risk from gas release, fire, and explosion; QRA confirms all risk contours fall within the facility boundary with proposed safeguards
- Socioeconomic — Positive: Significant positive impacts from local employment (minimum 60% local workforce commitment), technology transfer, community development investment, and substitution of flared gas with a commercially productive energy commodity
- Land Use: Temporary and permanent land take from fallow agricultural land; customary tenure arrangements documented; no involuntary resettlement required

MITIGATION COMMITMENTS

The Proponent commits to implementing the following principal mitigation measures, detailed in Chapters 6–7:

- Leak Detection and Repair (LDAR) programme: quarterly OGI camera inspection of all flanges, valves, and connectors; repair within 15 days of detection; target <0.5% methane loss of throughput
- Acoustic enclosures on all reciprocating compressors (minimum 15 dB(A) insertion loss); construction restricted to 07:00–18:00
- Secondary containment bunding at all liquid hydrocarbon storage and handling areas (minimum 110% vessel capacity); oil-water separator installed
- ESD and F&G systems: automatic blowdown on gas leak detection; 11 fire hydrants and 20 fire extinguishers per fire safety layout; NFPA 58/72-compliant systems
- Minimum 60% local employment during construction and operations phases

- Community Liaison Officer (CLO) embedded in the host community from project inception
- Bi-annual groundwater monitoring at 6 stations (2 upgradient control + 4 downgradient)
- Annual GHG inventory (ISO 14064) and methane LDAR programme to minimise Scope 1 emissions

REGULATORY STATUS AND APPROVALS REQUIRED

Approval / Permit	Status and Description
FMEEnv Environmental Compliance Certificate (ECC)	Required before construction commencement — ssthis Report constitutes the submission document; ECC issued by FMEEnv upon public hearing and review
NMDPRA Facility Permit	NMDPRA plant construction and operating permit — concurrent regulatory pathway; PERA clearance obtained May 2026
Akwa Ibom ASEPA State Permit	State-level environmental permit — to be obtained concurrently with the federal EIA process
FMEEnv EIA Certificate	Issued by the Federal Ministry of Environment upon review and public hearing, this report is the submission document
NMDPRA PERA Clearance	Obtained on submission of PERA Report (May 2026); Full EIA follows per NMDPRA requirement
Land Title / Certificate of Occupancy	Land purchased via documented agreement; C-of-O process initiated with Akwa Ibom State Lands Commission
IFC / AfDB Clearance	ESMS Framework (AfricEnergy/CNG/ESMS/2026/001) and this EIA submitted to IFI financiers for Category A review and No Objection
NOSDRA Oil Spill Contingency Plan	To be registered with NOSDRA before any construction or earthworks activity

Table ES-1: Regulatory Approvals Status

OVERALL CONCLUSION

No impact has been assessed as residually HIGH or VERY HIGH in significance following the implementation of proposed mitigation measures. All significant negative impacts are reduced to LOW or NEGLIGIBLE by the proposed ESMP measures. The project is assessed as environmentally and socially feasible, subject to the full implementation of the ESMP and compliance with all applicable FMEEnv regulatory requirements.

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Appendix B: Laboratory Certificate of Analysis- Soil Samples (SS Series)

Appendix C: Chain of Custody Records

Appendix D: Stakeholder Engagement Documentation

Appendix E: Fire Safety Layout Drawing

Appendix F: Environmental Sampling Point Location Map

Appendix G: Ibesikpo Asutan LGA Location and Service Level Maps

Appendix H: Technical Process Diagrams and Alternative Route Maps

Appendix I: Community Infrastructure Baseline Photographs

LIST OF ACRONYMS

Acronym	Full Meaning
AKSEMA	Akwa Ibom State Emergency Management Agency
AKSMEMR	Akwa Ibom State Ministry of Environment and Mineral Resources
ASEPA	Akwa Ibom State Environmental Protection Agency
ALARP	As Low As Reasonably Practicable
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BLEVE	Boiling Liquid Expanding Vapour Explosion
BOD₅	5-Day Biochemical Oxygen Demand
BOI	Bank of Industry
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CAP	Corrective Action Plan
CDA	Community Development Agreement
CDP	Community Development Programme
CFP	Chance Find Procedure
CLO	Community Liaison Officer

CMS	Convention on Migratory Species
CNG	Compressed Natural Gas
COD	Chemical Oxygen Demand
COREN	Council for the Regulation of Engineering in Nigeria
C-of-O	Certificate of Occupancy
DCS	Distributed Control System
DFI	Development Finance Institution
DMP	Decommissioning Management Plan
DO	Dissolved Oxygen
EC	Electrical Conductivity
ECC	Environmental Compliance Certificate
ECO	Environmental Compliance Officer
EHSO	Environmental, Health, Safety and Operations
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EP4	Equator Principles IV (2020)
ERP	Emergency Response Plan
ESG	Environmental, Social and Governance
ESMP	Environmental and Social Management Plan

ESMS	Environmental and Social Management System
ESD	Emergency Shutdown System
F&G	Fire and Gas Detection System
FEED	Front-End Engineering Design
FGD	Focus Group Discussion
FME_{nv}	Federal Ministry of Environment
FPIC	Free, Prior and Informed Consultation
GFCP	Gas Flare Commercialisation Programme
GHG	Greenhouse Gas
GM	Grievance Mechanism
GSPA	Gas Supply and Purchase Agreement
GW	Groundwater monitoring borehole
GWC	Groundwater control borehole
HAZID	Hazard Identification Study
HAZOP	Hazard and Operability Study
HFO	Heavy Fuel Oil
HMI	Human-Machine Interface
H₂S	Hydrogen Sulphide
IEC	International Electrotechnical Commission

IFC	International Finance Corporation (World Bank Group)
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organisation for Standardisation
IUCN	International Union for Conservation of Nature
JSA	Job Safety Analysis
KII	Key Informant Interview
LDAR	Leak Detection and Repair
LGA	Local Government Area
LNG	Liquefied Natural Gas
LP	Low Pressure
LTi	Lost Time Incident
LTIFR	Lost Time Incident Frequency Rate
MCA	Multi-Criteria Analysis
MEDEVAC	Medical Evacuation
MMSCFD	Million Standard Cubic Feet per Day
MOC	Management of Change
NACA	National Agency for the Control of AIDS
NAFDAC	National Agency for Food and Drug Administration and Control
NCMM	National Commission for Museums and Monuments

NDDC	Niger Delta Development Commission
NESREA	National Environmental Standards and Regulations Enforcement Agency
NGEP	National Gas Expansion Programme
NGML	Nigerian Gas Marketing Limited
NIMET	Nigerian Meteorological Agency
NMDPRA	Nigerian Midstream and Downstream Petroleum Regulatory Authority
NO_x	Nitrogen Oxides
NOSDRA	National Oil Spill Detection and Response Agency
NTS	Non-Technical Summary
OGI	Optical Gas Imaging
OHS	Occupational Health and Safety
PERA	Preliminary Environmental Risk Assessment
PCS	Project Concept Screening
PIA	Petroleum Industry Act 2021
PLC	Programmable Logic Controller
PM₁₀	Particulate Matter ≤ 10 microns aerodynamic diameter
PM_{2.5}	Particulate Matter ≤ 2.5 microns aerodynamic diameter
PPE	Personal Protective Equipment
PRMS	Pressure Reduction and Metering Skid

PSM	Process Safety Management
PSP	Priority Sequential Panel
QRA	Quantitative Risk Assessment
ROW	Right-of-Way
SCADA	Supervisory Control and Data Acquisition
SIL	Safety Integrity Level
SLM	Sound Level Meter
SO₂	Sulphur Dioxide
SOP	Standard Operating Procedure
SPM	Suspended Particulate Matter
TCF	Trillion Cubic Feet
TDS	Total Dissolved Solids
TMP	Traffic Management Plan
TPH	Total Petroleum Hydrocarbons
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
UNGPs	UN Guiding Principles on Business and Human Rights
UUTH	University of Uyo Teaching Hospital
VEC	Valued Ecosystem Component

VOC	Volatile Organic Compound
VSC	Valued Social Component
WMP	Waste Management Plan
WGS84	World Geodetic System 1984

ACKNOWLEDGEMENT

The Management of AfricEnergy and Infrastructure Limited expresses sincere appreciation to:

1. Our experienced consultant, Quaternary International Company Limited for the execution, compiling, and writing this report. We also thank the following AfricEnergy and Infrastructure Limited staff who worked dedicatedly with the consultation on this study:

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3. Akwa Ibom State Ministry of Environment
4. Uyo Government Area Administration
5. All Community members

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CHAPTER ONE

INTRODUCTION

1.1 Background Information

AfricEnergy and Infrastructure Limited (hereinafter 'the Proponent' or 'AfricEnergy') is a Nigerian-registered energy and infrastructure company with operations in the compressed natural gas, oil and gas services, and energy infrastructure sectors. The company holds the statutory authority and technical capacity to develop, own, and operate midstream gas processing facilities in Nigeria. AfricEnergy is the project proponent, developer, and intended owner-operator of the proposed 2.5 MMSCFD CNG Mother Station. The Proponent's principal office is located at 16A Sam Oyovbaire Street, Guzape, FCT, Abuja, Nigeria.

The proposed CNG Mother Station arises from the Proponent's strategic assessment of the natural gas supply and distribution landscape in Akwa Ibom State and the South-South geopolitical zone of Nigeria. The rationale for the project rests on three converging drivers:

1.1.1 Nigeria's Gas Monetisation Imperative

Nigeria holds some of the largest proven natural gas reserves on the African continent, estimated at approximately 206 trillion cubic feet (TCF). However, a significant proportion of associated gas continues to be flared or vented due to inadequate midstream infrastructure. The Federal Government's Gas Flare Commercialisation Programme (GFCP) and the Decade of Gas initiative (2021–2030) explicitly incentivise private sector investment in gas processing and distribution projects that convert flared or stranded gas into commercial commodities. The proposed CNG plant directly supports these national policy objectives by monetising gas from the Savanna pipeline system.

1.1.2 Energy Access and Industrial Demand

Akwa Ibom State and the surrounding South-South region face persistent energy access challenges, with unreliable grid electricity averaging only 6–10 hours per day and limited access to clean-burning industrial fuels. CNG presents a cost-competitive, lower-emission alternative to diesel and HFO, approximately 40–60% cheaper per km for heavy vehicles, and producing approximately 25% less CO₂ per unit of energy than diesel. The proposed facility will supply CNG

via daughter station tube trailers to commercial and industrial consumers, supporting economic activity and improving energy access across the state.

1.1.3 Commercial Viability

The project draws on an established gas supply pathway from the Savanna pipeline system (8-inch lean gas header at approximately 250 bars operating pressure), reducing upstream supply risk. The CNG dispensing market in South-South Nigeria is undersupplied relative to demand, presenting a commercially viable opportunity with strong projected internal rates of return as documented in the Proponent's project financial model. Phase 1 capital investment is estimated at USD 3.5 million; Phase 2 expansion to 5 MMSCFD is planned without additional land acquisition.

1.2 Administrative and Legal Framework

1.2.1 Federal Legislation

Legislation	Relevance to This Project
EIA Act CAP E12 LFN 2004	Primary legal basis: mandates full EIA for Schedule 2 projects, including natural gas handling, compression, storage, and distribution; FMEnv is the approving authority; requires public hearing before ECC issuance
Petroleum Industry Act (PIA) 2021	Governs the midstream gas sector; establishes NMDPRA as the regulatory authority for midstream and downstream petroleum; requires environmental compliance as a licence condition
NMDPRA Environmental Guidelines and Standards (EGASPIN) 2nd Edition	Prescribes technical, safety, and environmental standards for midstream petroleum facilities, including CNG plants; requires PERA and Full EIA as part of the plant licensing process

NESREA National Environmental Standards (Various)	Air Quality Regulations (2014); Noise Standards (2009); Surface and Groundwater Quality (2011); Sanitation and Waste Control (2009); applicable to construction and operational phases
Land Use Act CAP L5 LFN 2004	Governs land acquisition in Nigeria; Certificate of Occupancy (C-of-O) required; customary rights must be identified and compensated
NDDC Act 2000	NDDC levy applies to petroleum industry projects in the Niger Delta region; CSR obligations in host communities
NOSDRA Act 2006	Requires registration of an Oil Spill Contingency Plan before construction; notification within 24 hours of any Tier 1 or greater spill event
Minerals and Mining Act 2007	Relevant if construction requires quarrying of aggregates or sand dredging within the study area

Table 1.2: Applicable Federal Legislation and Regulatory Framework

1.2.2 State and Local Legislation

- Akwa Ibom State Environmental Protection and Waste Management Agency (ASEPA) Law: requires state-level environmental permit concurrent with the federal EIA process
- Akwa Ibom State Land Administration: manages Certificate of Occupancy and land title processes at the state level
- Ibesikpo Asutan LGA Development Control: local authority approval for construction activities and site access

1.2.3 International Standards and IFI Requirements

Standard / Framework	Application to This Project
IFC Performance Standards 1–6 & 8 (2012)	Core international E&S standards; PS1 requires full ESIA and ESMS; PS2–PS8 address labour, pollution, community H&S, resettlement, biodiversity, and cultural heritage
Equator Principles IV — EP4 (2020)	Project classified as Category A (significant impacts); requires full ESIA, ESMS, stakeholder engagement plan, and grievance mechanism meeting IFC PS standards
AfDB Environmental and Social Assessment Procedures (ESAP)	AfDB financing pathway; Category 1 project requiring independent E&S review
IFC EHS Guidelines — Oil & Gas Processing	Technical guidance on emission standards, noise limits, and safety management for gas processing facilities
ISO 14001:2015	AfricEnergy ESMS Framework (AfricEnergy/CNG/ESMS/2026/001) is aligned with ISO 14001 structure
ISO 45001:2018	Reference standard for OHS management; applied in Labour Management Procedure and OHS Plan
ASME Section VIII; ANSI B31.3; API-RP520; API-500A; NFPA 58/72	Technical design codes for pressure vessels, piping, pressure relief, area classification, and fire protection

Table 1.2.3: International Standards and IFI Requirements

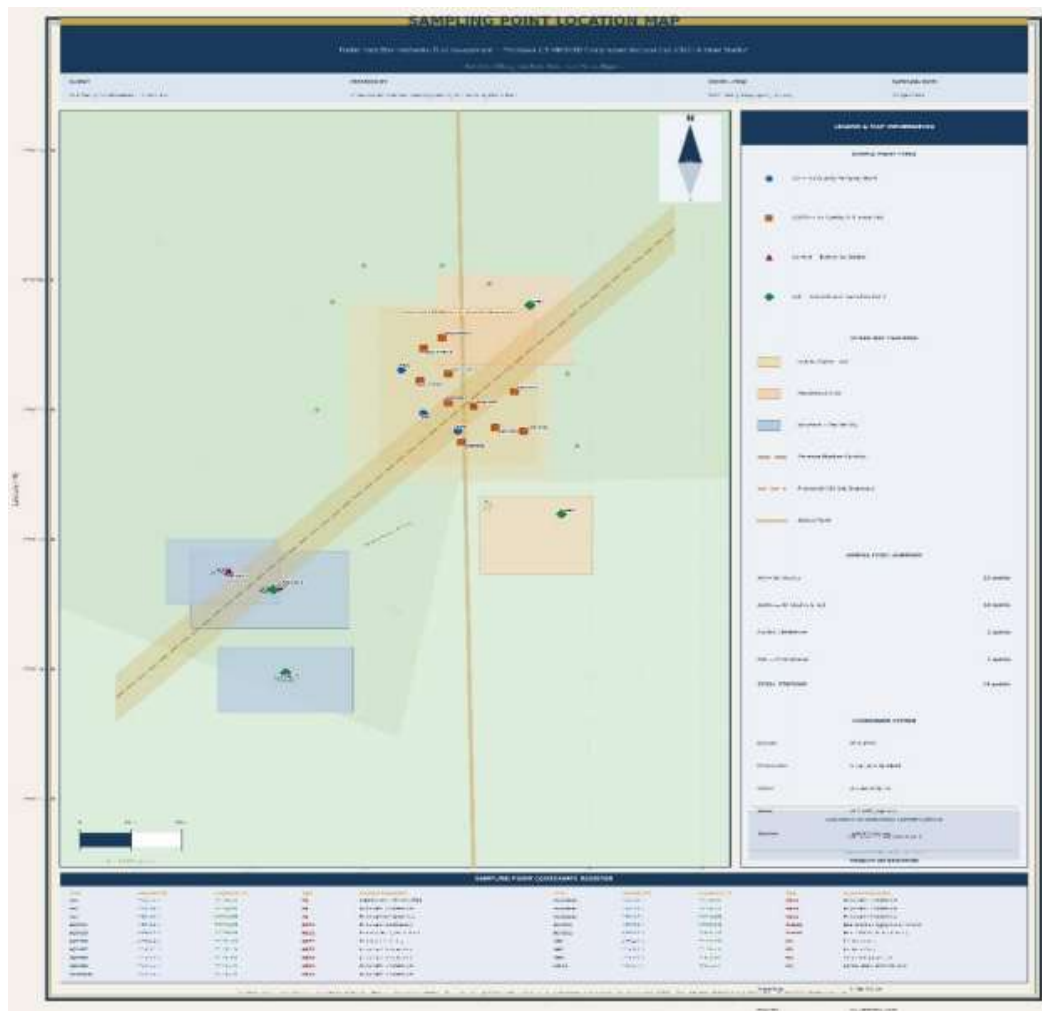
1.3 EIA Process History and Terms of Reference

The Terms of Reference were prepared by AfricEnergy. The Scoping Report defined the ToR, which was reviewed and approved by the Federal Ministry of Environment before the commencement of detailed baseline surveys.

1.4 Data Sources and Limitations

This EIA Report draws on the following primary and secondary data sources: PERA Report field data (household surveys, groundwater quality, air quality at AQ1–AQ13 and AQ/SSC1–2, soil sampling SS series, ecological reconnaissance at 19 stations — all 29–30 April 2026); FEED documentation (Aspen Hysys process simulation, Peng-Robinson EOS; fire safety layout Drawing No. A3-01, Scale 1:200); NIMET meteorological data; secondary data (IUCN Red List, World Bank/IFC EHS Guidelines, NBS demographic data); and secondary EIA baseline reference (FMEnv ESIA for Phase III Energizing Education Programme, 2022 by Savanna Pipeline — same project area).

The primary data limitation is the absence of a full 12-month meteorological record from an on-site station at the time of report preparation. Baseline surveys were conducted during the late dry season/early wet season transition (April 2026). All data gaps and their potential effect on impact predictions are clearly identified in the relevant sections.



Map 4: Environmental Baseline Survey Sampling Point Location Map — showing 13 air quality/soil stations (AQ1–AQ13), 2 control stations (AQ/SSC1, AQ/SSC2), 3 site groundwater boreholes (GW1: 04°56'44.9"N/007°57'05.3"E; GW2: 04°56'39.1"N/007°57'06.3"E; GW3: 04°56'37.0"N/007°56'57.1"E), 1 control borehole (GWC1: 04°56'34.7"N/007°56'57.5"E), and the ~4,000 m² direct project footprint within the ~2.5 ha site boundary

CHAPTER TWO

PROJECT JUSTIFICATION

2.1 Need for the Project

2.1.1 The National Energy Access Problem

Akwa Ibom State sits at the heart of Nigeria's oil and gas-producing region, the area most associated, in the public mind, with the country's energy wealth, and yet experiences average grid electricity supply of only 6 to 10 hours per day. This gap between resource abundance and energy access is itself part of the justification: the state has access to gas as a raw resource but has historically lacked the midstream infrastructure to convert that resource into usable, reliable energy for its own population and businesses.

The practical consequence of this supply gap is that the majority of households, businesses, and industrial establishments in the state have had to substitute self-generated power for the unreliable grid, specifically, diesel generators and Heavy Fuel Oil (HFO) boilers. This substitution carries three compounding costs: it is expensive (diesel and HFO are costly fuels, and self-generation is inherently less efficient than centralised or networked supply); it is polluting (diesel and HFO combustion produce significant air pollution at the point of use, often in or near residential and commercial areas); and it is carbon-intensive (diesel and HFO have a substantially higher carbon footprint per unit of useful energy than natural gas). The project's justification rests partly on offering an alternative that addresses all three of these costs simultaneously, rather than trading one off against another.

2.1.2 The Gas Flaring and Monetisation Problem

In 2023 alone, Nigeria flared more than 7 billion standard cubic feet of gas per day. Flaring is, in effect, the deliberate burning off of a usable energy resource because it cannot economically be captured, transported, or sold, typically because the midstream infrastructure (pipelines, processing, compression, storage) needed to bring it to market does not exist at the location where the gas is produced. This represents a double loss: the energy value of the gas is wasted, and the act of flaring itself releases greenhouse gases and other pollutants for no productive benefit.

This is precisely the gap that a CNG Mother Station is designed to close. By tapping into the existing Savanna gas pipeline and adding the compression, dehydration, and storage infrastructure needed to turn that gas into a transportable, sellable product (CNG), the project converts what would otherwise be an underused or wasted resource into a commercial energy supply. In this sense, the project's need case is not simply 'there is energy demand', it is the more specific case that 'there is a particular, well-understood market failure (lack of midstream infrastructure) preventing an available resource from meeting that demand,' and the project is designed to fix exactly that failure.

2.2 Value of the Project

Value Dimension	Specific Value Generated
Energy Security	2.5 MMSCFD of gas monetised; displaces equivalent diesel consumption of approximately 750,000 litres/day across the daughter station network; reduces Nigeria's diesel import dependency
Climate and GHG	CNG emits approximately 25% less CO ₂ per unit energy than diesel; lifecycle GHG savings are estimated at 12,000–18,000 tCO ₂ e/year across distribution network; contributes to Nigeria's NDC under the Paris Agreement
National Economic	Reduces Nigeria's diesel import bill; generates gas royalties for the Federation; earns fiscal revenue for Akwa Ibom State; contributes to PIA 2021 midstream development objectives
Community Employment (Construction)	Estimated 120–180 direct construction jobs over 9 months; minimum 60% (72–108 persons) sourced from Ikot Obio Offiong and Ibesikpo Asutan LGA per Local Content Commitment
Community Employment (Operations)	20–25 permanent direct jobs; 30–40 indirect jobs stimulated in logistics, maintenance, and supply chain; estimated operational payroll NGN 18–25 million/annum in direct community wages

Energy Access	Affordable, reliable CNG to commercial generators, industrial boilers, and transport operators across Akwa Ibom State; 40–60% cheaper per km than diesel for heavy vehicles
Social Investment	Community Development Programme funded at a minimum of 2% of operational net revenue (NDDC-aligned); priorities: scholarships (5/yr), vocational skills training, healthcare support, road rehabilitation, agricultural support
Technology Transfer	Skills development in CNG operations, instrumentation, and maintenance for local workforce; COREN-compatible training programme

Table 2.2: Project Justification — Need, Value, and Sustainability Assessment

2.3 Envisaged Sustainability

Environmental Sustainability: The facility is sited on degraded bush fallow scrubland (*Chromolaena odorata* dominant) with no resettlement requirement. An ESMP and ESMS govern environmental performance throughout the project lifecycle. GHG emissions are minimised through electric-drive compressors, LDAR programmes, and a zero-routine-flaring commitment. Climate resilience is built into the facility design (1:100 flood protection; drainage for 25 mm/hr rainfall intensity).

Economic Sustainability: The project has a projected operational life of 25 years, underpinned by a Gas Supply and Purchase Agreement (GSPA) framework with NGML. The CNG market in South-South Nigeria is undersupplied. A ring-fenced decommissioning fund will be established from Year 5 of operations. Phase 2 expansion to 5 MMSCFD is planned without additional land acquisition.

Social Sustainability: A Community Development Agreement (CDA) to be executed before construction, a permanent Grievance Mechanism, and a minimum 60% local employment policy will sustain positive community relationships and deliver measurable social investment throughout the operational life.

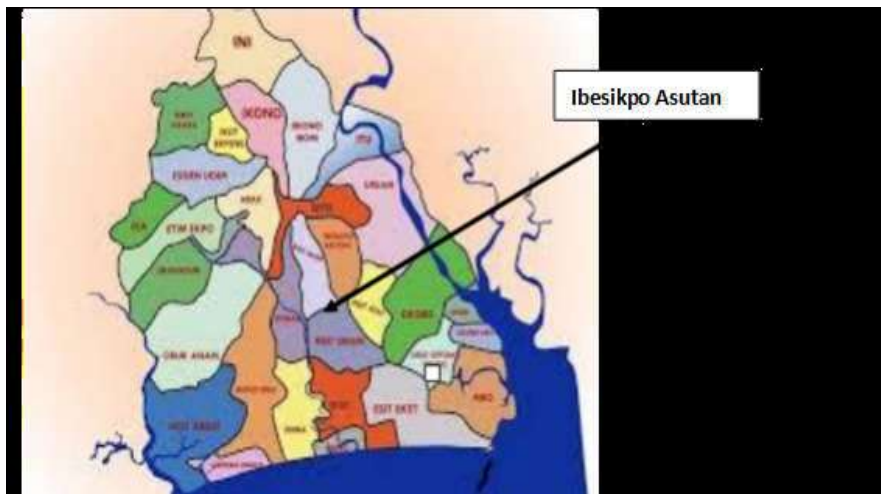
CHAPTER THREE

PROJECT AND PROCESS DESCRIPTION

3.1 Type of Project and Location

The proposed project is a Compressed Natural Gas (CNG) Mother Station — a midstream natural gas compression, dehydration, storage, and distribution facility — classified under the NMDPRA CNG Code of Practice (2020) as a 'Type A' CNG Mother Station and within Schedule 2 of the EIA Act CAP E12 LFN 2004, mandating a Full EIA.

Location: Ikot Obio Offiong Community, Ibesikpo Asutan Local Government Area, Akwa Ibom State, Nigeria. Site centre coordinates: approximately 04°56'42"N, 007°57'03"E (WGS84 datum). Site footprint: approximately 4,000 m² direct project area within approximately 2.5 hectares site boundary. Currently characterised by degraded secondary scrubland (bush fallow). The site is bounded to the north by the Savanna 8-inch lean gas pipeline (the gas supply source); to the east by Ikot Obio Offiong community residential settlement (~800 m); to the south by the Ikot Obio Offiong Road (primary access and mobilisation route); and to the west by fallow agricultural land (proposed buffer zone).



Map 1: Akwa Ibom State LGA Administrative Map — Ibesikpo Asutan LGA (indicated by arrow)

3.2 Input and Output of Raw Materials and Products

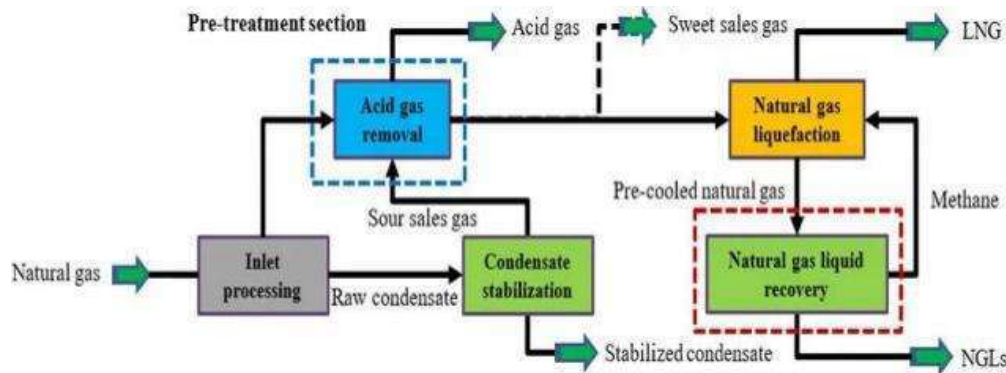


Figure 3.2: CNG Processing Route — Pre-Treatment, Inlet Processing (Acid Gas Removal / Condensate Stabilisation), Natural Gas Liquid Recovery, and CNG Compression/Storage/Dispensing pathway

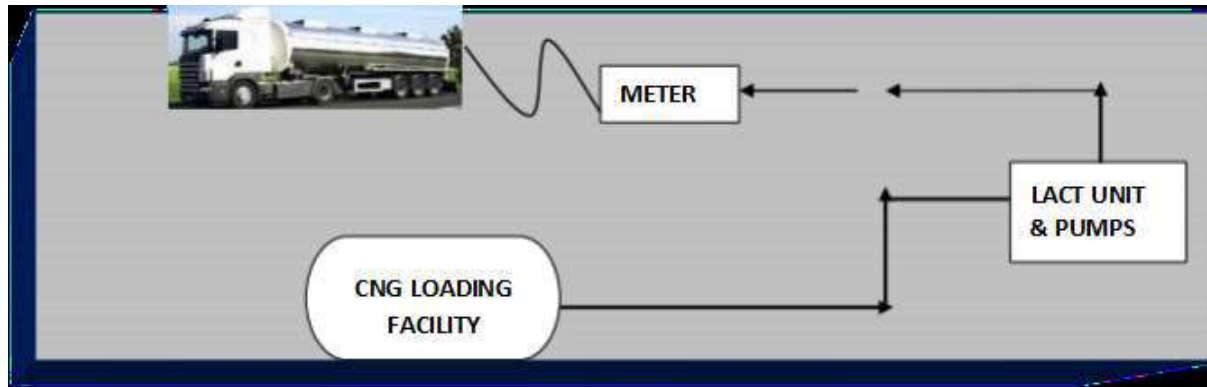


Figure 3.2: CNG Loading Facility — Tube Trailer, Metering System, LACT Unit, and CNG Loading Facility Schematic

Category	Description
Feed Gas Input	2.5 MMSCFD natural gas from Savanna 8-inch lean gas header at approximately 250 bar; composition per PCS Tables 5-2 and 5-3 (Aspen Hysys simulation, Peng-Robinson EOS)
Primary Product Output	Compressed Natural Gas (CNG) at 3,260–3,600 psig (rated to 4,350 psig); dispensed at 80 kg/min per dual hose to daughter station tube trailers for distribution to consumers
Power Consumption (Primary)	3 × 350KVA gas generators (primary power source); powered by process gas

Power Consumption (Emergency)	1 × 100KVA CAT diesel generator (emergency backup only; used during startup or gas supply interruption)
Water Consumption	Utility water for fire suppression system, welfare facilities, and equipment washing; sourced from local borehole or municipal supply
Atmospheric Emissions	NO _x , CO, VOCs from gas engine compressors (operations); particulates from diesel generator; fugitive methane from flanges, valves, and seals; flare emissions during controlled maintenance venting
Liquid Waste	Compressor lubricating oil (classified hazardous — FMEnv licensed disposal via approved contractor); glycol dehydration chemical waste (if applicable); condensate from dehydration process (contained and disposed via certified contractor)
Solid Waste	Spent desiccant from gas drying unit (silica gel — for regeneration or licensed disposal); used filter cartridges and oil-contaminated rags (hazardous); domestic waste from welfare facilities; construction waste (Phase C only)
Wastewater	Sanitary wastewater from welfare facilities (package sewage treatment plant or septic system); stormwater from site (through oil-water separator before any discharge); zero process wastewater discharge to surface water
Noise	Continuous operational noise from reciprocating compressors, gas generators, cooling fans, and daughter station tube trailer loading traffic

Table 3.2: Process Inputs, Outputs, and Waste Streams

3.3 Technological Layout — Facility Components

No.	Component	Technical Description	Key Design Parameters
1	Tie-in and Inlet Pipeline	6-inch diameter pipeline connecting the existing Savanna 8-inch lean gas header to the CNG plant inlet. Anti-corrosion coated; buried at a minimum of 3 m depth along a 450 m route. Isolation valve at tie-in point.	Operating pressure: ~250 bar; pipeline length: 450 m; burial depth: 3 m; anti-corrosion coating per NMDPRA specification
2	PRMS — Pressure Reduction & Metering Skid	Two 100% orifice meter runs providing gas flow measurement and pressure reduction from header to plant inlet operating pressure. Slam-shut safety valves, pressure regulators, and DCS-linked alarm systems.	Dual redundancy: 2 × 100% metering runs; slam-shut valves; safe vent to atmosphere; DCS/SCADA alarm integration
3	Gas Drying / Filtration Unit	Solid desiccant (silica gel) twin-tower adsorption for gas dehydration to CNG quality. Dew-point monitor provides continuous quality verification. Regeneration via electric or gas-fired heater.	Desiccant: silica gel adsorption; dew-point target: -40°C; dual-tower design (adsorb/regenerate cycle); integrated dew-point analyser
4	Compressor Unit	1 × booster compressor + 3 × gas inlet compressors providing multi-stage compression LP→HP. Power supply from 3 × 350KVA	LP stage: 29–116 psi; HP stage: 110–1,016 psi; gas generators: 3 × 350KVA; emergency diesel: 1 × 100KVA CAT; MRU/JT/Turbo-Expander hybrid technology

		gas generators with 1 × 100KVA CAT diesel generator as emergency backup.	
5	Priority Sequential Panel (PSP)	Controls the cascade filling sequence from high-bank (>2,900 psig) to medium-bank to low-bank, optimising storage utilisation. DCS/SCADA integrated.	High-bank: >2,900 psig; cascade hierarchy control; integrated with DCS/SCADA
6	CNG Cascade Storage Tanks	Multiple CNG storage vessels providing buffer capacity. Steel construction (ASME Section VIII) to NMDPRA specification; lightning arrestors; fixed water deluge/sprinkler system.	Tank capacity: 780 m ³ each; steel wall thickness: 8/12/6 mm; NMDPRA specification; lightning arrestors; sprinkler system per fire safety layout
7	CNG Dispensing Unit	Dual-hose dispensing to daughter station tube trailers and direct consumers. Mass flow meters with temperature compensation for accurate custody transfer.	Dispensing pressure: 3,260–3,600 psig (rated to 4,350 psig); flow rate: 80 kg/min; dual hose; mass flow meter with temperature compensation
8	DCS Control System	Allen-Bradley Distributed Control System (DCS) with Human-Machine Interface (HMI) and SCADA capability. Motor run status, alarm management, process	Allen-Bradley platform; HMI workstations; SCADA remote monitoring; alarm management; event sequence recorder; remote monitoring capability

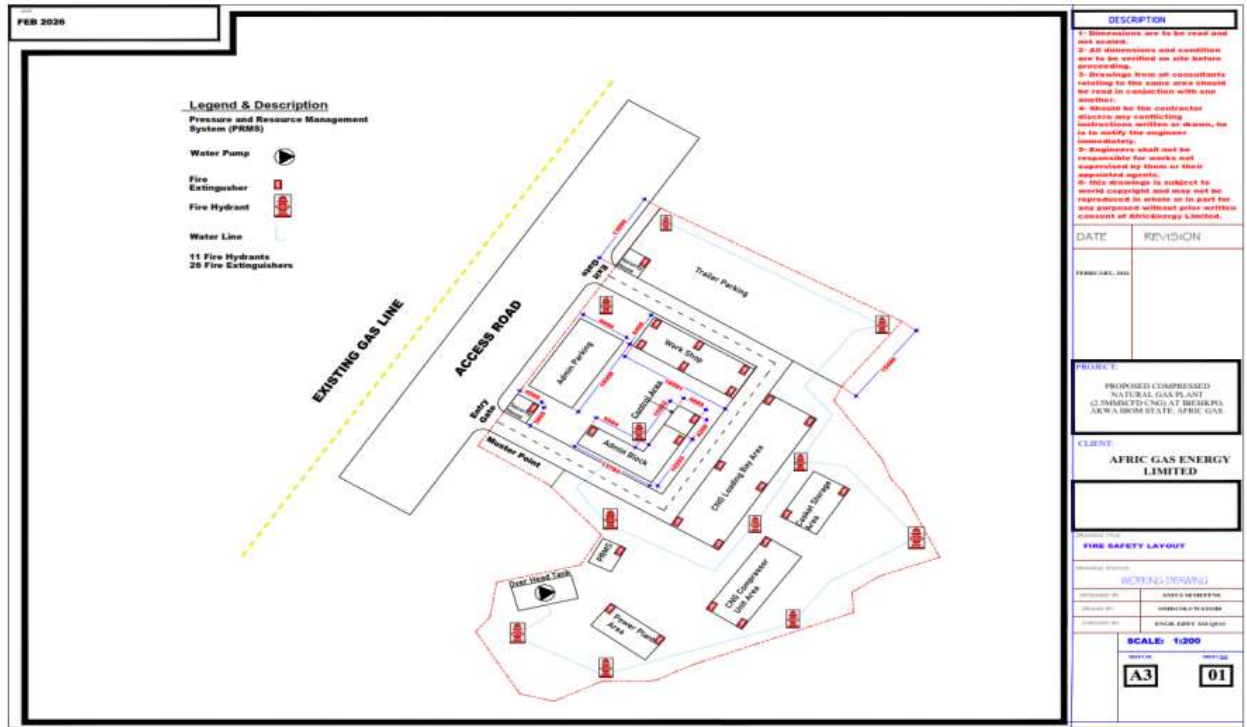
		archiving, and operational reporting.	
9	ESD and F&G System	High-reliability PLC managing Emergency Shutdown (ESD) and Fire & Gas (F&G) detection. Automatic blowdown valves; ESD+F&G cause-and-effect logic matrix; sequence of event recorder.	High-reliability PLC; automatic blowdown valves; ESD/F&G cause-and-effect matrix; sequence of event recorder; tested quarterly per NMDPRA requirement
10	Utility Systems	Controlled gas venting (flare/vent system); closed sump and drain system; instrument air compressor; fuel gas conditioning; utility water supply; power distribution panel; oil-water separator.	Flare system for controlled venting; closed drain sumps; instrument air; fuel gas conditioning; utility water; OWS (oil-water separator); power distribution panel

Table 3.3: Facility Components and Technical Specifications

3.4 Facility Site Layout

The site layout has been developed through the FEED process. It is shown in Map 3 (Fire Safety Layout, February 2026, Scale 1:200, Drawing No. A3-01, designated by Anita Ekempine). The layout is organised around the following functional zones: Gas inlet and PRMS area (northern boundary, adjacent to the Savanna pipeline tie-in); Compression system area (central processing zone); CNG cascade storage banks (750 SCM total capacity; arranged in parallel banks); CNG loading manifolds area; Trailer filling stations area (with dual-hose dispensing units); Administrative office building (with DCS/HMI and SCADA workstations); Maintenance workshop area; Security gatehouse (controlling access from the southern access road); Trailer parking area; Internal road network; Drainage and stormwater system (directing runoff through oil-water separator to contained sump); and Perimeter fencing with CCTV monitoring.

Fire safety infrastructure: 11 fire hydrants and 20 fire extinguishers distributed per the fire safety layout. A fixed water deluge system protects the CNG storage cascade banks. The PRMS water pump and fire suppression water storage are at the northern section.



Map 3: AfricEnergy CNG Mother Station — Fire Safety Layout (Scale 1:200, Drawing No. A3-01). Shows all functional zones, 11 fire hydrant positions, 20 fire extinguisher positions, Savanna Gas Pipeline tie-in, access road, and perimeter boundary

3.5 Key Design Parameters

Parameter	Specification
Design throughput	2.5 MMSCFD with 20% overcapacity design factor (effective capacity: 3.0 MMSCFD)
Feed gas source	Savanna 8-inch lean gas header; operating pressure approximately 250 bar
Feed gas composition	Per PCS Tables 5-2 and 5-3 (Aspen Hysys simulation, Peng-Robinson EOS)

Processing route	MRU/JT/Turbo-Expander hybrid technology (Aspen Hysys simulation verified)
Inlet tie-in pipeline	6-inch diameter, 450 m length, 3 m burial depth, anti-corrosion coated
LP compression stage	29–116 psi operating range
HP compression stage	110–1,016 psi operating range
Dispensing pressure	3,260–3,600 psig (rated to 4,350 psig)
CNG storage capacity	780 m ³ per tank; 750 SCM cascade bank total
Dispensing flow rate	80 kg/min per hose; dual-hose dispensing unit
Design life	25 years
Operating regime	Continuous; 24 hours/day, 365 days/year
Applicable design codes	ASME Section VIII (pressure vessels); ANSI B31.3 (process piping); API-RP520 (pressure relief); API-500A (area classification); FM Requirements (fire protection); NFPA 58/72
Control system	Allen-Bradley DCS/SCADA with HMI workstations; ESD and F&G PLC (high-reliability)
Power supply (primary)	3 × 350KVA gas generators
Power supply (emergency)	1 × 100KVA CAT diesel generator
Fire protection	11 fire hydrants; 20 fire extinguishers; fixed water deluge system on CNG cascade storage
Facility footprint	~4,000 m ² direct project area within ~2.5-hectare site boundary; perimeter fenced with CCTV

Phase 1 capital investment	USD 3.5 million
Construction workforce (peak)	80–120 persons
Permanent operations workforce	15–25 persons (Plant Manager, Control Room Operators, Field Operators, Maintenance Technicians, EHSO Officer, CLO, Security, Administration)

Table 3.5: Key Design Parameters — CNG Mother Station

3.6 Production Process

During normal operations, the CNG Mother Station operates continuously under the supervision of a qualified operations team. Natural gas is received from the Savanna pipeline through the PRMS, dried to dew-point specification (-40°C) in the twin-tower silica gel unit, and compressed in multiple stages (LP: 29–116 psi; HP: 110–1,016 psi) to cascade storage pressure. The Priority Sequential Panel (PSP) manages the cascade filling hierarchy (high-bank $>2,900$ psig $\rightarrow$ medium-bank $\rightarrow$ low-bank) to optimise storage utilisation. Daughter station tube trailers connect to the dispensing manifold, fill to 3,600 psig at 80 kg/min, and depart for distribution to daughter stations and industrial consumers. The Allen-Bradley DCS/SCADA continuously monitors all process parameters; the ESD/F&G PLC provides automatic safety shutdown on gas or fire detection.

3.7 Project Operation and Maintenance

Key operational activities: continuous gas receipt, compression, dehydration, storage, and dispensing; daughter station tube trailer filling (estimated 8–12 trailer movements per day); daily operational data logging and SCADA reporting; preventive maintenance per manufacturer schedules (daily, weekly, monthly, quarterly, annual maintenance tasks per NMDPRA requirements); quarterly LDAR inspection of all fugitive emission sources; bi-annual groundwater monitoring at 6 stations; monthly community liaison meetings; and annual emergency response drills with AKSEMA.

3.8 Construction Methodology and Project Schedule

Phase	Activity	Description	Duration	Key Environmental Control
C1	Site Mobilisation	Contractor mobilisation; temporary facilities (site office, welfare, storage); perimeter fencing; security gatehouse; CLO activation; baseline monitoring commencement	Month 1	Community engagement; access road condition survey; baseline monitoring start
C2	Site Preparation & Clearing	No-burn vegetation clearance; topsoil stripping and stockpiling for reinstatement; site levelling and grading; access road construction/widening	Months 1–2	No-burn protocol; topsoil management; erosion control; dust suppression 2×/day
C3	Civil and Foundation Works	Foundation excavation and construction (strip or raft per geotechnical investigation); concrete batching and pouring; drainage and stormwater infrastructure; bunding and containment	Months 2–4	Concrete washwater management; noise control 07:00–18:00; groundwater protection
C4	Pipeline Construction	6-inch inlet pipeline trenching (3 m depth); pipe laying, SMAW/GTAW welding (ASME B31.3);	Months 2–5	Soil management; welding fume control; traffic management on access road

		radiographic inspection; anti-corrosion coating; backfilling and compaction; hydrostatic testing		
C5	Equipment Installation	Compressor skid erection; PRMS skid installation; CNG storage vessel erection; DCS/SCADA panel; ESD/F&G system; utility systems installation	Months 4–7	Heavy lift operations; equipment laydown area management; noise management
C6	Piping, Electrical & Instrumentation	Process piping fabrication and installation (ANSI B31.3); electrical cable installation; instrument installation; loop testing; DCS programming and configuration	Months 6–8	Cable trenching; spoil management; ongoing community noise communication
C7	Testing & Commissioning	Pressure testing (hydrostatic/pneumatic per ASME); instrument calibration; ESD/F&G functional testing; compressor run-in; gas introduction; NMDPRA pre-commissioning inspection	Months 8–9	Gas introduction safety protocol; ESD testing; community notification before gas introduction
C8	Site Reinstatement	Removal of temporary construction facilities; topsoil reinstatement at disturbed areas;	Month 9	Topsoil reinstatement (≥ 150 mm depth); invasive

		revegetation with indigenous species; waste clearance and disposal; site handover to operations		species prevention; final site inspection and sign-off
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Table 3.8: Construction Phases, Activities, and Environmental Focus Areas

3.8.1 Equipment and Materials Mobilisation

The key transportation route for mobilisation of heavy equipment and construction materials is from Onne Port to Ikot Obio Offiong, as identified in Map B of the PERA Report. The Ikot Obio Offiong Road serves as the primary access route and is substantially used by light and heavy goods vehicles serving existing light industrial establishments. A Traffic Management Plan (TMP) will be developed before the commencement of heavy haulage operations.

3.8.2 Construction Workforce

The construction workforce is estimated at a peak of 80–120 persons. A minimum of 60% of all positions (skilled and unskilled) will be filled from the Ikot Obio Offiong host community and Ibesikpo Asutan LGA, consistent with the Local Content Commitment. Worker welfare facilities will meet FMEnv and IFC PS2 standards. No forced or child labour will be employed. A Worker Code of Conduct covering GBV, sexual exploitation, and communicable disease prevention will be signed by all construction staff.

3.9 Decommissioning Concept

The facility has a design life of 25 years. At end-of-life, decommissioning will be conducted per a Decommissioning Plan prepared at least 3 years before planned cessation. Key elements: safe depressurisation and purging of all process equipment and pipelines; isolation and blinding of all pipeline tie-in points; removal of all above-ground process equipment, storage vessels, and piping; excavation and removal of the 450 m inlet pipeline; soil sampling and remediation of any hydrocarbon-contaminated soil; site grading and topsoil reinstatement; revegetation with local species per a Decommissioning Reinstatement Plan; and final environmental audit submitted to

FMEnv, NMDPRA, and IFI financiers. All decommissioning activities will be conducted in consultation with the host community, Ibesikpo Asutan LGA, and regulatory authorities. Decommissioning costs will be provisioned in the project financial model per IFC PS requirements with a ring-fenced fund established from Year 5.

CHAPTER 4

DESCRIPTION OF THE ENVIRONMENT

4.1 Introduction and Study Approach

This section describes the methodological framework adopted for the EIA. The methodology is designed to comply fully with the EIA Act CAP E12 LFN 2004, FMEnv EIA Procedural Guidelines, and international best practice standards, including the IFC Performance Standards and World Bank Group EHS Guidelines. The overall methodology consists of five interrelated phases: (i) preliminary screening and scoping; (ii) baseline data collection; (iii) impact identification and prediction; (iv) impact significance evaluation; and (v) mitigation planning, monitoring design, and reporting.

4.2 Screening and Scoping

4.2.1 Screening

Under EIA Act CAP E12 LFN 2004 Schedule 2, projects involving natural gas handling, compression, storage, and distribution are mandated to undergo a full EIA. The proposed 2.5 MMSCFD CNG Mother Station falls clearly within this category. A Preliminary Environmental Assessment (PEA) was conducted prior to this full EIA, confirming the need for a comprehensive study. NMDPRA classification of the project as a mid-tier gas infrastructure facility further confirmed the Full EIA requirement.

4.2.2 Scoping

Scoping was undertaken to define spatial and temporal boundaries, identify significant issues, and prioritise data collection. The Scoping Report defined the ToR approved by FMEnv before the commencement of detailed baseline surveys.

Scoping Issue	Significance at Scoping	Section Addressed
Air quality impacts from compressor emissions and fugitive gas	Moderate–High	Chapter 5 (Baseline), Chapter 6 (Impacts)
Noise and vibration from compressors and construction activities	Moderate	Chapter 5, 6, 8
Soil and groundwater contamination risk	Low–Moderate	Chapter 5, 6, 8
Fire, explosion, and gas leak hazard	High	Chapter 6, 8
Vegetation clearance and biodiversity loss	Low–Moderate	Chapter 5, 6, 8
Surface water quality and drainage impacts	Low–Moderate	Sections 5, 6, 8
Community health, safety, and well-being	Moderate	Sections 6, 8, 9

Employment and local economic development	Positive – Moderate	Chapter 6, 9
Traffic and road safety during construction	Moderate	Chapter 6, 8
Waste management	Low–Moderate	Chapter 6, 8
Greenhouse gas emissions	Low–Moderate	Chapter 6, 8
Emergency preparedness and response	High	Chapter 8

Table 4.2.2: Key Scoping Issues and EIA Coverage (Source: PERA Table 4.1)

4.3 Impact Identification and Significance Evaluation

4.3.1 Five-Step Assessment Methodology

The impact assessment applies a structured five-step methodology consistent with international best practice (Leopold et al., 1971; Dee et al., 1972; Rau, 1990) and FMEnv EIA Guidelines:

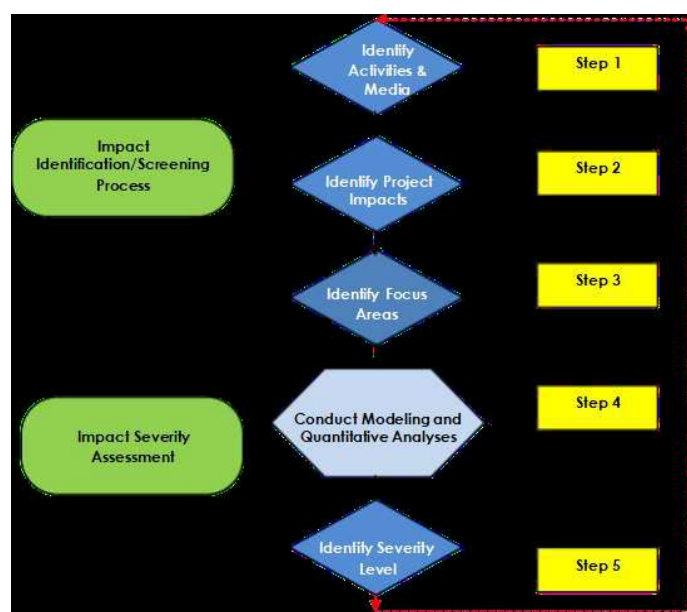


Figure 4.3.1: Five-Step Impact Identification and Severity Assessment Process — (1) Identify Activities and Media; (2) Identify Project Impacts; (3) Identify Focus Areas; (4) Conduct Modelling and Quantitative Analysis; (5) Identify Severity Level

4.3.2 Impact Characterisation Framework

Dimension	Classification Options	Criteria Used
Nature	Beneficial (B) — positive effect OR Adverse (A) — negative effect	Determined by direction of change relative to baseline
Causal Pathway	Direct (D) — caused directly by project activity OR Indirect (I) — through secondary mechanism	Linkage between project activity and receptor identified
Duration	Long-Term (LT) >5 yrs; Medium-Term (MT) 6 months–5 yrs; Short-Term (ST) <6 months; Very Short-Term <1 week	Timescale over which the impact persists
Reversibility	Reversible (R) — environment recovers OR Cumulative (C) — accumulates; potentially irreversible	Degree to which baseline conditions can be restored
Areal Extent	National; Regional; Local; Site Specific	Geographic extent of the impact footprint

Table 4.3.2: Impact Characterisation Framework (Rau Ad Hoc Method)

4.3.3 ISO 14001 EMS Significance Scoring Matrix

The ISO 14001 EMS evaluation methodology was applied as a cross-check. The scoring equation is: $\text{Score} = L + R + F + I + P$. Impacts scoring greater than 15 are classified as significant and require formal mitigation planning and inclusion in the ESMP.

Factor	Score Range	Description
L — Likelihood	1–5	Probability the impact will occur: 1 = Very Unlikely; 2 = Unlikely; 3 = Possible; 4 = Likely; 5 = Highly Likely
R — Reversibility	1–5	Whether the impact can be reversed: 1 = Fully reversible; 2 = Largely reversible; 3 = Partially reversible; 4 = Largely irreversible; 5 = Irreversible/Permanent
F — Frequency	1–5	How often the impact occurs: 1 = Once only; 2 = Rarely (<2/yr); 3 = Occasionally (2–5/yr); 4 = Frequently (5–10/yr); 5 = Continuously during the activity
I — Intensity	1–5	Magnitude and severity: 1 = Negligible; 2 = Minor; 3 = Moderate; 4 = Major; 5 = Very severe/Major
P — Non-compliance Probability	1–5	Likelihood of exceeding regulatory limits: 1 = Very unlikely; 2 = Unlikely; 3 = Possible; 4 = Likely; 5 = Highly probable
SIGNIFICANCE THRESHOLD	> 15	Impacts scoring >15 require formal mitigation and detailed monitoring plans in the ESMP

Table 4.3.3: ISO 14001 EMS Significance Scoring Matrix

4.3.4 Significance Rating Scale

Significance Index	Rating	Management Response Required
1–2	Negligible	No specific mitigation required; standard practice monitoring only
3–5	Low	Standard good practice measures sufficient; document in ESMP
6–9	Moderate	Targeted mitigation measures required; targeted monitoring programme; quarterly reporting
10–12	High	Specific mitigation and monitoring programme required; semi-annual audit
13–16	Very High	Fundamental design change or project rejection may be warranted

Table 4.3.4: Significance Rating Scale

4.4 Hazard Identification and Risk Assessment

A Hazard Identification (HAZID) workshop was conducted with engineering, operations, and HSE specialists. The HIRA methodology involved: HAZID workshop; Failure Modes and Effects Analysis (FMEA) for major process equipment; qualitative assessment using likelihood and consequence scoring; identification of risk reduction measures to achieve ALARP risk levels; and emergency response planning for residual risks.

4.5 Cumulative Impact Assessment

A cumulative impact assessment was conducted per IFC Good Practice Note on Cumulative Impact Assessment. Cumulative impacts from the project combined with other past, present, and reasonably foreseeable future projects in the same geographic area were evaluated, including: existing industrial development in Uyo metropolitan area; gas infrastructure development along the OB3 corridor; planned CNG daughter stations; urban growth and population increase in Uyo; and climate change as a background stressor on water resources, biodiversity, and community vulnerability.

4.6 Field Surveys and Primary Data Collection

Surveys were conducted over six (6) weeks by a multidisciplinary team at Ikot Obio Offiong (primary: 29–30 April 2026). Survey locations, frequencies, and parameters comply with FMEnv and IFC PS requirements.

- Air Quality: Hi-Vol gravimetric samplers (TSP, PM₁₀, PM_{2.5}); electrochemical sensors (CO, SO₂); passive diffusion tubes (NO₂); PID (VOCs, THC); FID (CH₄) at 13 on-site stations (AQ1–AQ13) + 2 control stations (AQ/SSC1: Savanna Pigging Station; AQ/SSC2: NIPCO Gas Facility); 24-hour sampling periods on 3 occasions
- Noise: Calibrated Type 1 sound level meters (IEC 61672); LAeq, LAmax, LA₉₀, LA₁₀ metrics; daytime (06:00–22:00) and night-time (22:00–06:00) measurements at 6 receptor locations (R1–R6); 15-minute sampling periods, three rounds per location per survey day
- Soils: Hand auger sampling to 1.5 m depth at 6 locations (SS series); analysis for texture, pH, EC, organic carbon, TPH, heavy metals (Pb, Cd, Hg, As, Cr, Zn), and PAHs; NAFDAC-accredited and ISO 17025-compliant laboratory
- Groundwater: 3 site boreholes (GW1–GW3) + 1 control borehole (GWC1); coordinates per Map 5; full physicochemical, nutrient, metals, TPH, BTEX, and microbiological suite per Certificate QICLL/AFRIC/01242

- Surface Water: 3 locations on seasonal stream (upstream reference, proximate to site, downstream receptor); full water quality suite including pH, DO, BOD, COD, TSS, TDS, turbidity, oil and grease, heavy metals, and faecal coliforms
- Vegetation: 12 × 20 m × 5 m belt transects + 24 × 1 m × 1 m quadrats within site footprint and 200 m buffer; species identification, growth form, density, and canopy cover; IUCN Red List assessment of all species
- Fauna: Point count surveys (avifauna, 3 rounds — morning and evening); line transect + camera trapping (mammals); visual encounter surveys (reptiles/amphibians); pitfall trap arrays (small mammals and herptiles); IUCN, CMS, and CITES assessment
- Socioeconomic: 120-household structured questionnaire; 3 focus group discussions (women: 22 participants; youth: 14 participants; adult men); key informant interviews with HRH Eteidung Emmanuel Udoh Ekanem (Traditional Ruler), Mr. Akpan Okon (Community Secretary), Cllr. Grace Effiong (Ward Councillor), health facility managers, and school principals

4.7 Quality Assurance and Data Reliability

- All field survey equipment was calibrated before and after each campaign per the manufacturer's specifications
- Laboratory analyses by NAFDAC-accredited, ISO 17025-compliant laboratory (Quaternary International, Port Harcourt) with certified reference materials and method blanks in each analytical batch
- Field data were double-entered and verified against original field sheets before analysis
- Socioeconomic questionnaires were pre-tested with a pilot sample of 10 households and revised before full deployment
- All photographs, GPS coordinates, and field records are archived in a secure project database
- The EIA was prepared under the direction of a Lead EIA Expert with more than 15 years of experience in Nigerian EIA practice

4.8 Study Limitations

- Baseline surveys were conducted during the late dry season/early wet season transition (April 2026). Seasonal variation in vegetation, surface water flow, and ambient air quality should be considered when interpreting baseline data
- A limited number of groundwater monitoring points were available; deeper aquifer characterisation was not within scope but is recommended as a precautionary measure before construction
- Community health data from Akwa Ibom State Ministry of Health were available at the LGA level rather than community level, limiting precision of health baseline characterisation
- Some community members were initially reluctant to participate due to prior experiences with infrastructure projects that did not deliver promised benefits; addressed through extended engagement and community intermediaries
- Cumulative impact assessment relied primarily on publicly available data and expert judgement due to limited disclosure of planned projects by other industrial developers

BASELINE CONDITIONS

4.9 Site Description and Location

The proposed CNG Mother Station is located within Ibesikpo Asutan LGA, Akwa Ibom State, Nigeria. The site coordinates are approximately Latitude 04°56'42"N, Longitude 007°57'03"E (WGS84). The site has a total boundary of approximately 2.5 ha with a direct project footprint of approximately 4,000 m². It is currently characterised by degraded secondary scrubland (bush fallow, *Chromolaena odorata* dominant) consistent with previously disturbed land. The site is accessed via a tarred state road (Ikot Obio Offiong Road) and is approximately 800 m from the nearest residential settlement, 1.2 km from the nearest primary school, and approximately 500 m from a small seasonal stream in the Qua Iboe River catchment.

4.10 Climatic Conditions

Akwa Ibom State lies within the humid tropical climate zone (Köppen Af), influenced by the Inter-Tropical Convergence Zone (ITCZ). Two distinct seasons: Wet Season (March–November) with southwesterly maritime winds, rainfall peaks June–July and September–October; and Dry Harmattan Season (November–February) with dry northeasterly winds from the Sahara. Annual rainfall averages approximately 2,850 mm — one of Nigeria's wettest cities.

Parameter	Annual Mean	Wet Season Range	Dry Season Range
Mean Annual Rainfall (mm)	2,850	250–380 mm/month	10–60 mm/month
Mean Temperature (°C)	27.0	26–30	24–29
Maximum Temperature (°C)	31.5	29–33	28–34
Relative Humidity (%)	82	80–92	68–78
Mean Wind Speed (m/s)	3.2	2.5–4.5 (SW dominant)	2.0–4.0 (NE Harmattan)
Sunshine Hours per Day	5.2	3.5–5.0	6.0–7.5
Reference Evapotranspiration (mm/yr)	1,200–1,400	—	—

Table 4.10: Baseline Meteorological Parameters, Uyo/Ikot Obio Offiong (NIMET Data 2016–2025)

4.11 Geology and Soils

The project site lies within the coastal plain sands geological formation of the Niger Delta and Cross River Basin transition zone, underlain by Cenozoic sedimentary sequences (Benin Formation — coarse-grained sands and gravels; Agbada Formation — alternating sands and shales). No significant geological hazards (active faults, seismic zones, unstable slopes) have been identified. Terrain is relatively flat to gently undulating (45–65 m ASL).

Soils are Ultisols (Ferric Luvisols) typical of the coastal plain sands — deeply weathered, reddish-brown, sandy loam to loamy sand, low to moderate fertility, moderate permeability, pH 5.2–6.1 (slightly acidic due to natural leaching). Baseline soil quality (PERA primary data, SS series, April 2026):

Parameter	Measured Range	FMEEnv Guideline	Status
pH (0–50 cm depth)	5.2 – 6.1	6.0 – 8.5	Slightly below lower limit — natural tropical leaching; no anthropogenic contamination
Total Petroleum Hydrocarbons / TPH (mg/kg)	< 50	5,000	Compliant — no pre-existing hydrocarbon contamination
Lead / Pb (mg/kg)	8 – 14	85	Compliant
Cadmium / Cd (mg/kg)	< 0.5	3	Compliant
Mercury / Hg (mg/kg)	< 0.1	1	Compliant
Arsenic / As (mg/kg)	2 – 5	20	Compliant

Zinc / Zn (mg/kg)	25 – 45	200	Compliant
Chromium / Cr (mg/kg)	< 1	50	Compliant
Organic Carbon (%)	0.8 – 1.6	—	Typical for disturbed tropical laterite soils — low due to historical disturbance

Table 4.11: Baseline Soil Quality Results — PERA Primary Data (SS series, April 2026; Quaternary International Laboratory)

4.12 Hydrology and Water Resources

4.12.1 Surface Water

The project site lies within the Qua Iboe River catchment. A small seasonal stream approximately 500 m from the site drains westward and discharges into a tributary of the Qua Iboe River. The stream carries flow primarily during the wet season (April–October) and becomes intermittent during the dry season peak. The stream is used by local farmers for small-scale irrigation and washing but is not a primary potable water source. Baseline surface water quality results:

Parameter	Upstream	Mid-point	Downstream	FMEnv/NESREA Limit
pH	6.8	6.6	6.5	6.5 – 8.5
Dissolved Oxygen (mg/L)	7.2	6.8	6.4	> 5.0
BOD₅ (mg/L)	2.1	3.4	4.8	< 10
COD (mg/L)	12	18	26	< 40

Total Suspended Solids (mg/L)	18	24	31	< 30
Oil & Grease (mg/L)	< 0.5	0.8	1.2	< 10
Faecal Coliforms (CFU/100 mL)	210	480	870	< 400 (Class II)
Lead Pb (mg/L)	< 0.01	< 0.01	< 0.01	< 0.05

Table 4.12.1: Baseline Surface Water Quality — Seasonal Stream (~500 m from site)

4.12.2 Groundwater — Complete Primary Baseline Data (PERA Table 6.1)

Groundwater in the Uyo area is contained within the unconfined aquifer of the Benin Formation sands. Depth to water table: 8–20 m below ground level (shallower during wet season).

Recharge rate: estimated 200–400 mm/year. Baseline quality from 3 site boreholes (GW1–GW3) and 1 control borehole (GWC1), sampled 29 April 2026, analysed by Quaternary International (Ref: QICLL/AFRIC/01242):

Parameter	GW1	GW2	GW3	GWC1 (Ctrl)	NMDPRA Limit
pH	7.02	7.08	7.91	6.94	6.5 – 8.5
Electrical Conductivity (µS/cm)	25.48	21.80	22.72	26.15	NA
Total Dissolved Solids (mg/L)	15.28	13.0	13.6	15.69	200–500
Temperature (°C)	27.4	27.4	27.2	26.8	25

Dissolved Oxygen (mg/L)	6.90	6.80	6.90	6.90	NA
Turbidity (NTU)	0.28	0.32	0.32	0.32	25
Total Suspended Solids (mg/L)	0.0016	0.0001	0.0006	0.0011	NA
BOD₅ (mg/L)	3.60	3.20	4.60	3.10	NA
COD (mg/L)	7.52	3.76	7.50	3.70	NA
Sulphate (mg/L)	< 0.001	< 0.001	< 0.001	< 0.001	< 250
Nitrate (mg/L)	0.061	0.072	0.162	0.051	50
Phosphate (mg/L)	4.000	2.000	3.000	1.000	NA
Sodium (mg/L)	0.066	0.018	0.023	0.049	NA
Potassium (mg/L)	0.049	0.039	0.138	0.049	NA
Calcium (mg/L)	0.227	0.184	0.151	0.284	NA
Manganese (mg/L)	0.199	0.142	0.051	0.284	NA
Total Heterotrophic Bacteria THB (CFU/ml × 10³)	2.5	2.2	1.2	1.0	NA
Total Coliform (CFU/ml × 10³)	0–9 (mean 5)	0–9 (mean 5)	0–9 (mean 5)	0	2
Oil and Grease (mg/L)	0.263	0.242	< 0.001	< 0.001	0.5
TPH (mg/L)	< 0.001	< 0.001	< 0.001	< 0.001	5,000

BTEX (mg/L)	< 0.001	< 0.001	< 0.001	< 0.001	10
Lead Pb (mg/L)	< 0.001	< 0.001	< 0.001	< 0.001	0.075
Iron Fe (mg/L)	0.012	0.033	0.039	0.037	0.1
Zinc Zn (mg/L)	0.253	0.286	0.405	0.378	0.8
Chromium Cr (mg/L)	< 0.001	< 0.001	< 0.001	< 0.001	0.03
Mercury Hg (mg/L)	< 0.001	< 0.001	< 0.001	< 0.001	0.0003
Nickel Ni (mg/L)	< 0.001	< 0.001	< 0.001	< 0.001	0.075

Table 4.12.2: Complete Groundwater Quality Results. All parameters within NMDPRA limits. No TPH, BTEX, or heavy metals were detected above detection limits — confirming a clean groundwater baseline.


QUATERNARY INTERNATIONAL CO. LIMITED

OUR REF: QICLL/AFRIC/01242 DATE: 18/05/2024

CERTIFICATE OF ANALYSIS

NAME OF CLIENT	AFRIC ENERGY LTD.	DATE SAMPLED	28/04/2024
ADDRESS OF CLIENT	IBESIKPO ASUTAN, AKWA IBOM STATE	DATE RECEIVED	08/05/2024
PROJECT TITLE	PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA)	SAMPLE MATRIX	WATER

TEST	UNIT	NMDPRA LIMIT	AP GW 1	AP GW 2	AP GW 3	AP GWC
pH	—	6.5 – 8.5	7.52	7.28	7.81	7.94
Electrical Conductivity	µS/cm	NA	21.48	21.86	22.72	28.18
Total Dissolved Solid	mg/l	200 – 500	15.28	13.8	13.6	13.69
Temperature	°C	15	27.4	27.2	27.4	26.8
Salinity	ppt	NA	0.01	0.01	0.01	0.01
Dissolved Oxygen	mg/l	NA	6.96	6.96	6.9	6.9
Turbidity	NTU	25	0.0	0.28	0.32	0.33
Total Suspended Solid	mg/l	NA	0.0018	0.0001	0.0003	0.0011
CO ₂	mg/l	NA	3.760	7.32	7.88	3.71
BOD	mg/l	NA	3.690	3.205	4.990	3.190
Biochemical	mg/l	<100	0.141	<0.001	<0.001	<0.001
Alkalinity	mg/l	100	1.06	1.06	2.06	3.06
Nitrate	mg/l	50	0.072	0.061	0.162	0.091
Nitrite	mg/l	NA	0.028	0.030	0.011	0.013
Phosphate	mg/l	NA	2.090	4.060	1.890	1.090
Reactive silice	mg/l	NA	0.263	0.250	0.236	0.011
Ammonium	mg/l	NA	<0.001	<0.001	<0.001	<0.001
Potassium	mg/l	NA	0.040	0.030	0.138	0.040
Sodium	mg/l	NA	0.060	0.056	0.018	0.106
Magnesium	mg/l	NA	0.215	0.095	0.141	0.093
Calcium	mg/l	NA	0.184	0.237	0.191	0.284
Manganese	mg/l	NA	0.186	0.162	0.031	0.284
Fluoride	(µfused) µg/l	NA	2.0	2.1	1.8	1.1
Iron	(µfused) µg/l	NA	2.5	2.2	1.2	1.0
Thiobar	(µfused) µg/l	NA	0.0	0.7	0.2	0.4
Thiobar	(µfused) µg/l	NA	0.7	0.8	0.5	0.1
Total Coliform	(µfused) µg/l	NA	2	3	0	0
Oil & Grease	mg/l	0.0	0.002	0.242	<0.001	<0.001
TPH	mg/l	2000	<0.001	<0.001	<0.001	<0.001
BTEX	mg/l	10	<0.001	<0.001	<0.001	<0.001
Copper	mg/l	0.033	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/l	0.006	<0.001	<0.001	<0.001	<0.001
Lead	mg/l	0.078	<0.001	<0.001	<0.001	<0.001
Iron	mg/l	0.1	0.012	0.033	0.039	0.037
Zinc	mg/l	0.8	0.253	0.286	0.405	0.378
Chromium	mg/l	0.03	<0.001	<0.001	<0.001	<0.001
Vanadium	mg/l	NA	<0.001	<0.001	<0.001	<0.001
Barium	mg/l	0.425	<0.001	<0.001	<0.001	<0.001
Mercury	mg/l	0.0003	<0.001	<0.001	<0.001	<0.001
Nickel	mg/l	0.075	<0.001	<0.001	<0.001	<0.001

I HEREBY CERTIFY THAT WE HAVE ANALYZED THE ABOVE SAMPLE AS REQUESTED FROM OUR CLIENT, AND HONESTLY PRESENT OUR FINDINGS.

NAME OF ANALYST: 

SIGNATURE: NANCY AFIAYE



APPROVED BY: 

SAMUEL IKE JOSEPH - LEGAL

Appendix Figure 12.1: Certificate of Analysis — Groundwater Samples GW1, GW2, GW3, and GWC Control (Quaternary International Company Limited; Client: Afric Energy Ltd; Project: PERA; Location: Ibesikpo Asutan, Akwa Ibom State;

Date Sampled: 29/04/2026; Ref: QICLL/AFRIC/01242; Date of Analysis: 18/05/2026; Analyst: Nancy Ikpire; Approved by: Gabrieline Joseph-Legend, Lab Manager)

4.13 Baseline Air Quality Assessment

Ambient air quality was monitored during the dry season (representing near-worst-case baseline conditions: lowest atmospheric dispersion, highest Harmattan dust loading). All 13 on-site stations (AQ1–AQ13) received a "NO POLLUTION" designation from NMDPRA. PERA Table 6.2 primary data:

Parameter	Site Mean (2026)	Site Range (2026)	Control Mean (AQ/SSC)	NMDPRA Limit	2022 Baseline (FMEnv EIA)
VOC ($\mu\text{g}/\text{m}^3$)	0.14	0.0 – 0.4	0.35	160	0.2
NO ₂ ($\mu\text{g}/\text{m}^3$)	0.0015	0.0 – 0.01	0.015	200	0.04
SO ₂ ($\mu\text{g}/\text{m}^3$)	0.0	0.0	0.005	125	ND
CO ($\mu\text{g}/\text{m}^3$)	0.53	0.1 – 1.1	1.1	20	9
CO ₂ (ppm)	484	470 – 501	534	NA	490
CH ₄ ($\mu\text{g}/\text{m}^3$)	< 0.001	0.0	< 0.001	NA	ND
SPM ₁₀ ($\mu\text{g}/\text{m}^3$)	2.31	2.0 – 3.0	4.0	250	15.8
SPM ₅ ($\mu\text{g}/\text{m}^3$)	1.85	1.0 – 2.0	3.5	250	11.5
SPM _{2.5} ($\mu\text{g}/\text{m}^3$)	1.31	1.0 – 2.0	2.5	250	9.6
Noise Level dB(A)	45.33	42.2 – 48.2	59.95	85	45.9

Temperature (°C)	30.82	20.4 – 33.4	33.95	25	—
Relative Humidity (%)	72.77	62.8 – 82.0	59.65	NA	—
Wind Speed (m/s)	1.35	0.6 – 2.3	1.15	NA	—
Wind Direction	SW	SW dominant	SW	NA	—

Table 4.13: Baseline Air Quality and Meteorological Results — NMDPRA designation: "NO POLLUTION" at all 13 on-site stations. SPM_{10} at $2.31 \mu\text{g}/\text{m}^3$ is 85% below the 2022 EIA baseline of $15.8 \mu\text{g}/\text{m}^3$. No CH_4 , SO_2 , BTEX, or methane detected.

4.14 Baseline Noise Level Assessment

Receptor Location	Land Use	Day LAeq dB(A)	Night LAeq dB(A)	FME_{env} Day	FME_{env} Night
R1 – Site Boundary (North)	Scrubland / Industrial fringe	52	38	90	—
R2 – Nearest Residential (~800 m)	Residential	48	35	55	45
R3 – Place of Worship (~950 m)	Religious / Community	46	33	55	45

R4 – Roadside Commercial (~300 m)	Commercial	61	44	70	60
R5 – Farmland (~600 m)	Agricultural	43	32	55	45
R6 – Background (2 km upwind)	Rural / peri-urban	38	28	—	—

Table 4.14: Baseline Noise Survey Results — All measurements within FME_{env} limits.

4.15 Vegetation Cover Characteristics and Ecologically Sensitive Areas

Stratum	Height Range	Status in Project Area
A-Storey (Emergents)	> 20 m	ABSENT — emergent trees >20 m have been removed by timber extraction; none within project area of influence
B-Storey	15 – 20 m	Upper canopy trees present in buffer zone (outside 4,000 m ² direct footprint)
C-Storey	10 – 15 m	Sub-canopy trees; secondary canopy in buffer zone
D-Storey / Shrub Layer	< 2 m	Dense shrub layer; Chromolaena odorata dominant — most extensive stratum within the 4,000 m ² direct project footprint

E-Storey / Herb Layer	Ground level	Herb layer and ground cover: grasses, ferns, seedlings — <i>Imperata cylindrica</i> , <i>Panicum maximum</i>
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Table 4.15: Vegetation Strata — Project Area of Influence

No nationally or internationally designated protected areas, Ramsar wetland sites, Important Bird Areas (IBAs), or Key Biodiversity Areas (KBAs) within the 5 km study area. No IFC PS6 Critical Natural Habitats within the Zone of Direct Impact. The nearest forest reserve boundary is more than 8 km to the northeast.

No.	Scientific Name	Common / Local Name	Family	Significance
1	<i>Pycnanthus angolensis</i>	Akomu / African Nutmeg	Myristicaceae	Cash/timber crop; economically important to community
2	<i>Anthocleista vogelii</i>	Forest Sapo Tree	Gentianaceae	Forest tree; local medicinal use; B/C-storey species
3	<i>Pentaclethra macrophylla</i>	Oil Bean Tree / Ugba	Mimosaceae	Economic and food crop; regionally important; high community value
4	<i>Pterocarpus osun</i>	Osun / Camwood	Fabaceae	Cash/medicinal/timber crop; culturally significant
5	<i>Dialium guineense</i>	Tallow Tree / Icheku	Caesalpiniaceae	Food and timber species

6	Alchornea cordifolia	Christmas Bush / Ewe Ipa	Euphorbiaceae	Medicinal and pioneer species; common in secondary growth
7	Baphia nitida	Camwood / Osun	Fabaceae	Dye and timber species; culturally significant
8	Spondias mombin	Hog Plum / Iyeye	Anacardiaceae	Food species; fruit-bearing; community value
9	Mangifera indica	Mango	Anacardiaceae	Food/cash crop; common in compound areas on site margins
10	Elaeis guineensis	Oil Palm	Arecaceae	Cash crop; scattered individuals on site margins
15	Chromolaena odorata	Siam Weed / Akintola	Asteraceae	INVASIVE ALIEN SPECIES — dominant on disturbed/fallow land; most extensive type within the 4,000 m ² direct footprint
16	Imperata cylindrica	Spear Grass	Poaceae	Pioneer/invasive grass — disturbed land
17	Lantana camara	Lantana	Verbenaceae	Invasive alien shrub — disturbed land

Table 4.15.1: Dominant Plant Species — Lowland Rainforest and Bush Fallow, Project Area of Influence. Note: *Chromolaena odorata* (invasive alien) is the most extensive species within the 4,000 m² direct footprint.



Plate 4.1: Smallholder rubber tree tapping — representative of the smallholder agro-forestry land use on the community periphery within the study area

4.16 Terrestrial Fauna and Wildlife

Fauna surveys recorded: 47 mammalian species (~25% of Nigerian mammalian fauna), 78 bird species, and 20 reptile species in the project area of influence. All species assessed against IUCN Red List, CMS, and CITES. No IUCN Red List Critically Endangered, Endangered, or Vulnerable species and no IFC PS6 Critical Natural Habitat features were recorded within the 4,000 m² direct project footprint. A CMS-listed Eurasian Roller (*Coracias garrulus* — Least Concern) was observed in the broader study area. Key avifauna: Village Weaver (*Ploceus cucullatus*), Common Bulbul (*Pycnonotus barbatus*), African Palm Swift (*Cypsiurus parvus*), Black Kite (*Milvus migrans*). Key mammals: Domestic Rat (*Rattus rattus*), African Grass Rat (*Arvicanthis niloticus*), Gambian Pouched Rat (*Cricetomys gambianus*). Key reptiles: Agama lizard (*Agama agama*), House gecko (*Hemidactylus mabouia*), Monitor lizard (*Varanus niloticus* — shed skin observed). Biodiversity value of the site fauna assemblage: Low.

4.17 Socioeconomic Studies

Indicator	Baseline Value (PERA Survey, April 2026)
Combined community population (estimated)	~8,400 persons in ~1,680 households across three host communities
Population below 18 years	~42%
Adult literacy rate	~74% (above national average; reflects Akwa Ibom State's historically strong education investment)
Modal educational attainment	Secondary (completed): 23.3% males/females combined (PERA Table C.3)
No formal education	10.8% of total surveyed population (males 11.3%; females 10.5%)
Primary occupation — Farming	28.6% of working population (PERA Table C.4; dominant formal livelihood)
Primary occupation — Informal / not formally employed	49.0% of working population (largest single category — subsistence and informal sector)
Primary occupation — Senior/Junior Office Workers	11.8% of working population
Median monthly household income	NGN 45,000–70,000 (~USD 28–43)

Households earning below ₦88,000/year	37% of households (PERA Table C.5 — income bracket analysis)
Households earning below ₦164,000/year	68% of households — below national poverty benchmarks
Electricity access (national grid)	~78% of households (average 6–10 hrs/day supply; remainder on generators/solar)
Potable water (piped AKSWC supply)	~45% of households
Households using hand-dug wells or boreholes	~38%; 10 operational private boreholes confirmed in community
Improved sanitation access	~62% of households
Primary health facilities	1 Primary Health Centre (10 beds, 3 doctors, 2 nurses, 10 paramedical staff); 2 clinics (16 beds, 7 nurses); 6 patent medicine stores — 11 health facilities total (PERA Table C.6)
Schools within the LGA area	17 schools total: 3 nurseries (458 pupils), 9 primaries (8,720 pupils), 3 secondaries (8,705 pupils) — 18,898 pupils and 256 staff
HIV/AIDS prevalence (Akwa Ibom State)	~5.5% per NACA 2021 data — among the higher rates in Nigeria
Community support for project (survey)	~68% support or neutral; 18% concerned about safety; 14% about noise/traffic

Table 4.17: Baseline Socioeconomic Data — Host Communities, Ibesikpo Asutan LGA

4.18 Detailed Socioeconomic Data Tables

4.18.1 Educational Attainments — Ikot Obio Offiong Community

No.	Educational Category	Male No.	Male %	Female No.	Female %	Total (% of 1,659)
1	No Formal Education	87	11.3%	93	10.5%	180 (10.8%)
2	Pre-Primary	52	6.7%	70	7.9%	122 (7.4%)
3	Primary (Uncompleted)	107	13.9%	101	11.4%	208 (12.5%)
4	Primary (Completed)	152	19.7%	189	21.3%	341 (20.5%)
5–6	Secondary (Uncompleted + Completed)	314	—	337	—	651 (39.2%); Completed: 386 (23.3%)
7	Tertiary (Uncompleted)	14	5.3%	68	7.6%	109 (6.6%)
8	Tertiary (Completed)	38	4.9%	31	3.5%	69 (4.2%)
9	Not Ascertained	10	1.3%	14	1.6%	24 (1.4%)
	TOTAL	771	100%	888	100%	1,659

Table 4.18.1: Educational Attainments — Ikot Obio Offiong Host Community

4.18.2 Household Income Distribution

No.	Income Class (₦ per annum)	No. of Households	% of Total
1	₦0 – ₦11,999	1	1%
2	₦12,000 – ₦49,999	11	11%
3	₦50,000 – ₦87,999	25	25%
4	₦88,000 – ₦125,999	21	21%
5	₦126,000 – ₦163,999	10	10%
6	₦164,000 – ₦201,999	11	11%
7	₦202,000 – ₦239,999	5	5%
8	₦240,000 – ₦277,999	3	3%
9	₦278,000 – ₦299,999	2	2%
10	₦300,000 – ₦499,999	7	7%
11	Not Ascertained	4	4%
	TOTAL	100	100%

Table 4.18.2: Household Income Distribution — Host Community (Note: 37% earn below ₦88,000/yr; 68% below ₦164,000/yr — below national poverty benchmarks).

4.18.3 Social Infrastructure

Type of Facility	Total No.	Enrolment / Capacity	Staffing
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Nursery Schools	3	458 pupils	26 staff
Primary Schools	9	8,720 pupils	188 staff (ratio 1:46)
Secondary Schools	3	8,705 pupils	42 staff (ratio 1:50)
SUB-TOTAL Education	17	18,898 pupils total	256 total staff
Primary Health Centre	1	10 beds; 3 doctors; 2 nurses; 10 paramedical staff	15 total staff
Clinics	2	16 beds; 7 nurses; 10 paramedical staff	17 staff
Patent Medicine Stores	6	—	—
Traditional Healing Centres	2	6 beds	—
TOTAL Health Facilities	11	32 beds total; 3 doctors	—
Churches	57	~8,500 members	—
Mosques	1	—	—
Other Religious Institutions	2	—	—

Table 4.18.3: Social Infrastructure — Education, Health, and Religious Facilities in the Host Area

4.18.4 Disease Incidence

No.	Disease	Male No.	Male %	Female No.	Female %	Total (%)
1	Malaria	265	23.4%	312	27.6%	577 (51.0%)
2	Diarrhoea / Gastroenteritis	82	7.2%	84	7.4%	166 (14.6%)
3	Dysentery	28	2.5%	38	3.3%	66 (5.8%)
4	Measles	22	1.9%	21	1.9%	43 (3.8%)
5	Whooping Cough	11	1.0%	11	1.0%	22 (2.0%)
6	Typhoid	40	3.5%	45	4.0%	85 (7.5%)
7	Cholera	34	3.0%	57	5.0%	91 (8.0%)
8	Yellow Fever	17	1.5%	8	0.7%	25 (2.2%)
9	Chicken Pox	11	1.0%	5	0.5%	17 (1.5%)
10	Others (Respiratory, Skin, Hypertension, etc.)	—	—	—	—	—
	TOTAL	—	—	—	—	1,132 cases recorded

Table 4.18.4: Disease Incidence in the Host Environment (Source: PERA Table C.8). Malaria is the dominant disease burden at 51%. Waterborne diseases (diarrhoea, dysentery, typhoid, cholera) collectively account for ~36%, indicating limited access to safe water.

4.19 Infrastructural Services

- Roads: Ikot Obio Offiong Road — tarred state-maintained road connecting the site to Uyo city. Internal community roads are predominantly unpaved and made of laterite, deteriorating significantly during the wet season.
- Water Supply: AKSWC piped scheme (intermittent); private boreholes and hand-dug wells serve the majority. 10 operational private boreholes in the community.
- Electricity: National grid connection averaging 6–10 hrs/day; diesel generators as backup for most households and businesses. High demand for clean energy alternatives.
- Healthcare: 1 Primary Health Centre (~1.4 km from site); 2 clinics; 6 patent medicine stores; nearest secondary hospital within 4 km in Uyo city; UUTH within 10 km.
- Education: 17 schools including 9 primary schools and 3 secondary schools within the LGA area of influence.
- Telecommunications: GSM network coverage (MTN, Airtel, Glo); broadband internet limited to Uyo urban core.



Plate 4.2 Community overhead water storage tank — Ikot Obio Offiong (baseline water supply infrastructure)



Plate 4.3: Community access road during wet season — flooded laterite road illustrating existing drainage and infrastructure deficit



Plate 4.4: Community Secondary Grammar School, Ikot Essien Ibesikpo, Ibesikpo Asutan LGA — educational infrastructure within 2 km of the project site



Plate 4.5: Typical community housing stock — block construction, corrugated iron roofing (PERA baseline field documentation, April 2026)



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OUR REF: QICLL/AFRIC/01242

DATE: 18/05/2026

CERTIFICATE OF ANALYSIS

NAME OF CLIENT	AFRIC ENERGY LTD.	DATE SAMPLED	29/04/2026
ADDRESS OF CLIENT	IBESIKPO ASUTAN, AKWA IBOM STATE	DATE RECEIVED	20/01/2026
PROJECT TITLE	PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA)	SAMPLE MATRIX	SOIL: A=(0-15cm) B=(15-30cm)

TEST	UNIT	NUPRC LIMIT	AF SS1A	AF SS1B	AF SS2A	AF SS2B	AF SS3A	AF SS3B	AF SS4A	AF SS4B	AF SS5A	AF SS5B
PH	—	NA	4.015	4.130	4.220	4.335	4.500	4.680	4.950	4.165	4.405	4.535
color	—	NA	reddish black brown	reddish black brown	grayish brown	gray	reddish black brown	reddish black brown	reddish black brown	reddish brown	dark reddish gray	dark reddish gray
EC	($\mu\text{S}/\text{cm}$)	NA	96,500	98,500	93,000	94,500	96,000	95,000	76,000	82,500	92,500	88,500
Sand	Particle Size	NA	95,000	88,000	93,000	95,000	95,000	93,000	94,000	91,000	95,000	95,000
Silt		NA	4,000	4,000	5,000	3,000	3,000	5,000	5,000	5,000	4,000	4,000
Clay		NA	1,000	3,000	2,000	2,000	2,000	2,000	1,000	4,000	1,000	1,000
Texture	—	NA	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND
Bulk Density	g/cm^3	NA	1.235	1.415	1.237	1.463	1.338	1.485	1.255	1.393	1.467	1.540
Porosity	%	NA	53.556	46.786	53.500	45.000	49.691	44.162	52.822	47.648	44.834	42.098
Permeability	g/cm^3	NA	1.500	1.600	1.600	1.600	1.700	1.500	1.500	1.600	1.500	1.600
Erosion potential	$\text{Na}/\text{Hr}/\text{Yr}$	NA	30	28	30	27	29	26	30	28	25	25
%Carbonate	%	mg/kg	1.502	1.580	1.872	1.931	1.833	1.911	1.775	2.087	1.970	1.892
Total Nitrogen	%	mg/kg	0.12	0.14	0.09	0.10	0.08	0.11	0.07	0.09	0.10	0.12
Av. Phosphorus	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate	mg/kg	NA	40.612	33.469	31.837	42.296	41.684	42.551	42.296	42.908	41.888	43.214
Nitrite	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
CEC	$\text{meq}/100\text{g}$	NA	0.947	0.588	0.930	0.497	0.886	0.490	0.840	0.403	0.894	0.922
Ammonium	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	$\text{meq}/100\text{g}$	NA	0.140	0.145	0.131	0.084	0.092	0.072	0.082	0.061	0.069	0.071
Sodium	$\text{meq}/100\text{g}$	NA	0.589	0.213	0.592	0.199	0.586	0.202	0.591	0.166	0.591	0.604
Magnesium	$\text{meq}/100\text{g}$	NA	0.112	0.116	0.106	0.107	0.103	0.105	0.083	0.085	0.094	0.096
Calcium	$\text{meq}/100\text{g}$	NA	0.106	0.114	0.101	0.106	0.105	0.111	0.084	0.090	0.139	0.152
THC	mg/kg	500	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH	mg/kg	5000	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BTEX	mg/kg	206	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PAH	mg/kg	40	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/kg	190	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/kg	120	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/kg	530	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/kg	720	0.197	0.469	0.203	0.183	0.218	0.222	0.218	0.305	0.353	0.318
Iron	mg/kg	NA	46.995	37.470	38.631	36.518	41.905	40.714	39.196	39.673	41.339	36.190
Vanadium	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/kg	380	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nikel	mg/kg	210	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/kg	55	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/kg	625	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/kg	0.3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
THB	(cfu/g) $\times 10^3$	NA	1.3	0.6	1.0	1.0	1.0	1.3	1.2	1.3	1.1	1.2
THF	(cfu/g) $\times 10^3$	NA	1.2	1.0	0.7	0.4	0.2	0.4	1.4	1.3	0.7	1.2
HUB	(cfu/g) $\times 10^3$	NA	0.6	0.7	0.7	0.2	0.3	0.8	0.2	0.6	0.3	0.6
HUF	(cfu/g) $\times 10^3$	NA	0.3	0.1	0.3	0.1	0.0	0.0	0.4	0.3	0.4	0.6

I HEREBY CERTIFY THAT WE HAVE ANALYSED THE ABOVE SAMPLE AS RECEIVED FROM OUR CLIENT, AND HEREBY PRESENT OUR FINDINGS

NAME OF ANALYST: 
SIGNATURE: NANCY IKPIRE



APPROVED BY: 
GABRIELINE JOSEPH-LEGEND
(LAB MANAGER)

Q0119 |

Appendix B.1: Certificate of Analysis — Soil Samples SS1A–SS5B (Quaternary International Company Limited; Sample Matrix: Soil A [0–15 cm] and Soil B [15–30 cm]; Ref: QICLL/AFRIC/01242; Date: 18/05/2026)



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 BRANCH OFFICE: PLOT 6, 3RD STREET, CTSFIM NABBAKAY AVAIL, UGBORIKWO EFURUN DELTA STATE. E-MAIL: info@quaternaryintl.com

CONT....

TEST	UNIT	NUPRC LIMIT	AF SS6A	AF SS6B	AF SS7A	AF SS7B	AF SS8A	AF SS8B	AF SS9A	AF SS9B	AF SS10A	AF SS10B
PH	—	NA	4.035	4.145	4.510	5.100	3.840	4.030	4.130	3.850	4.200	3.850
color	—	NA	dark reddish brown	dark reddish brown	brown	brown	reddish black brown	dark reddish brown	grayish brown	brown	brown	brown
EC	(μ S/cm)	NA	86.500	84.500	73.500	76.000	90.000	95.000	65.500	66.500	62.500	68.000
Sand	Particle Size	NA	93.000	93.000	94.000	92.000	94.000	93.000	94.000	93.000	94.000	93.000
Silt	NA	NA	5.000	6.000	5.000	6.000	5.000	5.000	5.000	6.000	5.000	5.000
Clay	NA	NA	2.000	1.000	1.000	2.000	1.000	2.000	1.000	1.000	1.000	2.000
Texture	—	NA	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND
Bulk Density	g/cm	NA	1.392	1.508	1.349	1.493	1.266	1.468	1.509	1.459	1.513	1.261
Porosity	%	NA	47.652	43.305	49.291	43.877	52.418	44.898	43.271	45.168	43.117	52.610
Permeability	g/cm	NA	1.500	1.700	1.700	1.500	1.500	1.600	1.600	1.600	1.600	1.600
Erosion potential	Ha/Hr/Yr	NA	26	25	29	25	31	25	25	26	25	30
% Carbonate	%	mg/kg	1.853	2.009	1.716	1.814	1.794	1.853	2.048	1.872	1.970	1.931
Total Nitrogen	%	mg/kg	0.11	0.04	0.10	0.13	0.09	0.11	0.12	0.16	0.12	0.15
Av. Phosphorus	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate	mg/kg	NA	42.194	43.316	42.398	43.878	43.010	44.337	43.418	41.531	43.214	42.194
Nitrite	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
CEC	meq/100g	NA	0.865	0.436	0.924	0.936	0.895	0.943	0.832	0.426	0.849	0.859
Ammonium	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	meq/100g	NA	0.066	0.072	0.079	0.062	0.042	0.064	0.039	0.054	0.057	0.061
Sodium	meq/100g	NA	0.606	0.199	0.608	0.626	0.620	0.636	0.607	0.174	0.593	0.607
Magnesium	meq/100g	NA	0.095	0.060	0.098	0.103	0.102	0.105	0.109	0.111	0.093	0.094
Calcium	meq/100g	NA	0.097	0.105	0.139	0.145	0.130	0.138	0.078	0.086	0.105	0.097
THC	mg/kg	500	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH	mg/kg	5000	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BTEX	mg/kg	206	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PAH	mg/kg	40	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/kg	190	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/kg	120	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/kg	530	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/kg	720	0.185	0.224	0.214	0.594	0.220	0.289	0.245	0.230	0.399	0.243
Iron	mg/kg	NA	37.083	44.018	39.196	39.673	37.827	41.458	40.685	39.345	38.780	42.827
Vanadium	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/kg	380	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/kg	210	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/kg	55	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/kg	625	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/kg	0.3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
THS	(μ g/g) $\times 10^1$	NA	1.8	1.2	1.0	0.9	1.2	1.5	1.1	1.3	1.3	1.5
THF	(μ g/g) $\times 10^1$	NA	1.4	1.1	0.4	0.2	1.5	1.2	1.7	1.1	1.0	1.2
HUB	(μ g/g) $\times 10^1$	NA	0.4	0.5	0.5	0.6	0.1	0.7	0.8	0.3	0.7	0.7
HUF	(μ g/g) $\times 10^1$	NA	0.1	0.7	0.0	0.0	0.2	0.7	0.1	0.6	0.3	0.3

I HEREBY CERTIFY THAT WE HAVE ANALYSED THE ABOVE SAMPLE AS RECEIVED FROM OUR CLIENT, AND HEREBY PRESENT OUR FINDINGS

NAME OF ANALYST: 
 SIGNATURE: NANCY IKPIRE



APPROVED BY: 
 GABRIELINE JOSEPH-LEGEND
 (LAB MANAGER)

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Appendix B.2: Certificate of Analysis — Soil Samples SS6A–SS10B (Continuation) (Quaternary International Company Limited; Ref: QICLL/AFRIC/01242



QUATERNARY INTERNATIONAL CO. LIMITED

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CONT....

TEST	UNIT	NUPRC LIMIT	AF SS11A	AF SS11B	AF SS12A	AF SS12B	AF SS13A	AF SS13B	AF SSC1A	AF SSC1B	AF SSC2A	AF SSC2B
PH	--	NA	4.000	3.850	4.340	4.070	3.990	4.000	4.380	4.320	4.235	3.800
color	--	NA	brown	brown	brown	brown	brown	brown	brown	brown	brown	brown
EC	(uS/cm)	NA	97.500	93.000	78.000	75.000	79.000	87.500	91.500	97.500	127.500	132.500
Sand	NA	NA	93.000	94.000	93.000	94.000	92.000	93.000	95.000	96.000	94.000	93.000
Silt	NA	NA	5.000	5.000	5.000	5.000	6.000	5.000	4.000	3.000	4.000	5.000
Clay	NA	NA	2.000	1.000	2.000	1.000	2.000	2.000	1.000	1.000	2.000	2.000
Texture	--	NA	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND
Bulk Density	g/cm	NA	1.391	1.267	1.269	1.350	1.440	1.309	1.470	1.240	1.422	1.372
Porosity	%	NA	47.715	52.366	52.304	49.243	45.878	50.776	44.730	53.395	46.525	48.423
Permeability	g/cm	NA	1.709	1.509	1.500	1.600	1.600	1.500	1.700	1.700	1.700	1.500
Erosion potential	Ha/Hr/Yr	NA	29	32	32	30	26	30	26	32	26	28
%Carbonate	%	mg/kg	1.794	1.853	1.619	1.560	1.482	1.404	1.911	2.009	1.970	1.931
Total Nitrogen	%	mg/kg	0.12	0.14	0.08	0.12	0.19	0.14	0.11	0.16	0.12	0.14
Av. Phosphorus	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate	mg/kg	NA	43.316	42.398	43.878	43.010	44.337	43.618	41.531	43.337	43.418	42.531
Nitrite	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
CEC	meq/100g	NA	0.392	0.804	0.760	0.796	0.885	0.931	0.964	0.881	0.572	0.887
Ammonium	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	meq/100g	NA	0.041	0.047	0.042	0.049	0.139	0.159	0.167	0.060	0.044	0.032
Sodium	meq/100g	NA	0.193	0.586	0.562	0.578	0.588	0.598	0.602	0.616	0.271	0.595
Magnesium	meq/100g	NA	0.080	0.084	0.073	0.076	0.082	0.085	0.106	0.110	0.105	0.108
Calcium	meq/100g	NA	0.078	0.087	0.083	0.093	0.075	0.089	0.089	0.095	0.152	0.153
THC	mg/kg	500	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH	mg/kg	5000	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BTEX	mg/kg	206	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PAH	mg/kg	40	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/kg	190	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/kg	120	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/kg	530	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/kg	720	0.324	0.222	0.237	0.262	0.189	0.230	0.805	0.378	0.438	0.235
Iron	mg/kg	NA	41.637	40.089	37.500	36.896	40.833	37.381	45.149	39.554	39.851	44.821
Vanadium	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/kg	380	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nikel	mg/kg	210	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/kg	55	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/kg	625	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/kg	0.3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
THB	(cfu/g) x10 ⁵	NA	1.3	1.1	1.6	1.2	1.3	1.2	1.2	1.4	1.2	0.8
THF	(cfu/g) x10 ⁵	NA	1.6	1.3	0.9	1.2	0.9	1.2	1.0	1.3	1.3	0.9
HUB	(cfu/g) x10 ⁵	NA	0.6	0.9	0.5	0.2	0.4	1.0	0.7	0.5	0.6	0.7
HUF	(cfu/g) x10 ⁵	NA	0.7	0.6	0.0	0.1	0.5	0.4	0.7	0.6	0.3	0.8

I HEREBY CERTIFY THAT WE HAVE ANALYSED THE ABOVE SAMPLE AS RECEIVED FROM OUR CLIENT, AND HEREBY PRESENT OUR FINDINGS.

NAME OF ANALYST: 
SIGNATURE: NANCY IKPIRE

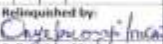
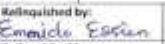
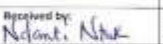


APPROVED BY: 
GABRIELINE JOSEPH-LEGEND
(LAB MANAGER)

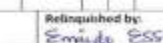
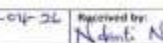
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Appendix B.3: Certificate of Analysis — Additional Soil Parameters including PAHs and Microbiology (Ref: QICLL/AFRIC/01242)

Appendix B.4: Certificate of Analysis — Additional Soil Quality Parameters (Ref: QICLL/AFRIC/01242)

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD								
QUATERNARY INTERNATIONAL COMPANY LIMITED								
PLOT 576, 14 TH STREET, DOPA ESTATE, UGHOIRIKOKO, EFFIRUN, DELTA STATE								
PROJECT NO:		PROJECT NAME: PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA)				PROJECT LOCATION: IBESIKPO ASUTAN, AKWA IBOM STATE		
Field Sample No./ Identification	Date/ Time	Crab Composite	Sample Container (Size/ Maker)	Sample Type (Surface Water, Soil, Sediment, etc.)	Preservation	Analysis Requested	Lab. Remark	Lab. Log Number
AF-GW1 AF-GW2 AF-GW3 AF-GW4	29-04-2026		1 Liter Plastic Can, Glass Bottle, 100ml Plastic Can, Amber Bottle	Ground Water	Sulphuric Acid, Nitric Acid, Ice Chest/ Cooler, Iced gel/ Iced block	PHYSICO-CHEMICAL: Colour, Alkalinity, BTEX, TPH, TSS, Oil and Grease BOD ₅ , COD, Anions /Cations: NH ₄ ⁺ , NO ₃ ⁻ , NO ₂ ⁻ , PO ₄ ³⁻ , SO ₄ ²⁻ , SiO ₃ ²⁻ , Na ⁺ , K ⁺ , Ca ²⁺ , Mn ²⁺ , Mg ²⁺ Heavy Metals: (Fe, Cd, Cr, Ni, V, Pb, Zn, Ba, Hg), etc. MICROBIOLOGY: THB, THF, THUB, THUF, Total coliforms.		
Sampler's Signature: 		Relinquished by: 		Date: 29/4/26	Relinquished by: 	Date: 29-04-26	Received by: 	Date: 29-4-26
Affiliation:		Relinquished by:		Date:	Relinquished by:	Date:	Received by:	Date:
Sampler's Remark:		Received for Laboratory by (Sign): Quaternary International Company Limited				Lab. Number:		
Samples were collected and preserved in accordance with EGASPIN 2018		Data Results to:				Distribution: Original accompanies sample movement, one copy analysis request file		
AFRIC ENERGY REP'S Name, Date & Sign:				QUATERNARY INT'L REP'S Name, Date & Sign:				
Eng. Idara Sylvester Umonyang 29/04/2026 				Emmanuel Eson  29/04/2026				

Appendix C.3: Analysis Request and Chain of Custody Record — Groundwater Samples AF-GW1 through AF-GW4 (Field Sample Date: 29/04/2026; Sampler: Eng. Idara Sylvester Umonyang; EGASPIN 2018 compliant; Received by Quaternary International)

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD								
QUATERNARY INTERNATIONAL COMPANY LIMITED								
PLOT 12 ODANI GREEN CITY, ELELEWON, PORT HARCOURT, RIVERS STATE								
PROJECT NO:		PROJECT NAME: PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA)				PROJECT LOCATION: IBESIKPO ASUTAN, AKWA IBOM STATE		
Field Sample No./ Identification	Date/ Time	Crab Composite	Sample Container (Size/ Maker)	Sample Type (Surface Water, Soil, Sediment, etc.)	Preservation	Analysis Requested	Lab. Remark	Lab. Log Number
AF-SS1 (0-15cm, 15-30cm) AF-SS2 (0-15cm, 15-30cm) AF-SS3 (0-15cm, 15-30cm) AF-SS4 (0-15cm, 15-30cm) AF-SS5 (0-15cm, 15-30cm) AF-SS6 (0-15cm, 15-30cm) AF-SS7 (0-15cm, 15-30cm) AF-SS8 (0-15cm, 15-30cm) AF-SS9 (0-15cm, 15-30cm) AF-SS10 (0-15cm, 15-30cm) AF-SS11 (0-15cm, 15-30cm) AF-SS12 (0-15cm, 15-30cm) AF-SS13 (0-15cm, 15-30cm) AF-SS14 (0-15cm, 15-30cm) AF-SS15 (0-15cm, 15-30cm)	29-04-2026		Aluminum Foil, Polyethylene Bag	Soil Sample	Aluminum Foil, Polyethylene Bag, Ice Chest/ Cooler, Iced gel/ Iced block	PHYSICO-CHEMICAL: pH, TPH, PAH, BTEX, Phenols, Percent Carbon, Cation exchange capacity (CEC), Conductivity, Oil and grease, texture, grain size analysis, porosity, permeability, bulk density, erosion potential, Available: PO ₄ ³⁻ , Total-N, NH ₄ ⁺ , NO ₃ ⁻ , NO ₂ ⁻ , Na ⁺ , K ⁺ , Ca ²⁺ , Mg ²⁺ Heavy Metals: Fe, Cd, Cr, Pb, Cu, Hg, Ar, Ni, V, Zn, Ba, As. MICROBIOLOGY: THB, THF, THUB, THUF.		
Sampler's Signature: 		Relinquished by: 		Date: 29-04-26	Relinquished by: 	Date: 29-04-26	Received by: 	Date: 29-4-26
Affiliation:		Relinquished by:		Date:	Relinquished by:	Date:	Received by:	Date:
Sampler's Remark:		Received for Laboratory by (Sign): Quaternary International Company Limited				Lab. Number:		
Samples were collected and preserved in accordance with EGASPIN 2018		Data Results to:				Distribution: Original accompanies sample movement, one copy analysis request file		
AFRIC ENERGY REP'S Name, Date & Sign:				QUATERNARY INT'L REP'S Name, Date & Sign:				
Eng. Idara Sylvester Umonyang 29/04/2026 				Emmanuel Eson  29/04/2026				

Appendix C.2: Analysis Request and Chain of Custody Record — Soil Samples AF-SS series (Field Sample Date: 29/04/2026; Sample Type: Soil; Preservation: Aluminium Foil/Polyethylene Bag; EGASPIN 2018 compliant)

**AIR QUALITY RESULT FOR THE PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA) OF THE
PROPOSED 2.5MMSCFD COMPRESSED NATURAL GAS (CNG) MOTHER STATION, IKOT OBIO OFFONG,
IBESIKPO ASUTAN L.G.A, AKWA IBOM STATE**

DATE: 29-04-2026

PARAMETERS	NMDPRA LIMIT	AF AQ1	AF AQ2	AF AQ3	AF AQ4	AF AQ5	AF AQ6	AF AQ7	AF AQ8	AF AQ9	AF AQ10	AF AQ11	AF AQ12
VOC ($\mu\text{g}/\text{m}^3$)	160	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.4	0.0	0.2	0.5
NO ₂ ($\mu\text{g}/\text{m}^3$)	200	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO ₂ ($\mu\text{g}/\text{m}^3$)	125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO ($\mu\text{g}/\text{m}^3$)	20	0.2	0.2	0.2	0.1	0.2	0.5	0.4	1.0	1.1	0.8	0.5	1.0
CO ₂ (ppm)		485.0	470.0	476.0	480.0	485.0	488.0	480.0	495.0	485.0	480.0	480.0	490.0
CH ₄ ($\mu\text{g}/\text{m}^3$)	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Temperature (°C)	25	29.6	30.2	30.9	30.6	30.4	31.1	31.8	32.3	32.5	32.6	32.9	32.4
Relative Humidity (%)	NA	82.0	79.8	78.1	78.4	79.4	75.2	72.6	69.1	68.5	67.4	64.5	68.0
Wind Speed (m/s)	NA	2.0	1.2	1.8	1.1	1.4	1.4	0.6	0.9	1.2	1.6	1.2	0.8
Wind Direction	NA	SW	SW	SW	SW	SW	SW	SW	SW	SW	SE	SW	SW
SPM ₁₀ ($\mu\text{g}/\text{m}^3$)	250	3.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
SPM ₅ ($\mu\text{g}/\text{m}^3$)	250	2.00	2.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
SPM _{2.5} ($\mu\text{g}/\text{m}^3$)	250	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	1.00	2.00	1.00
Noise Level dB(A)	85	48.2	45.3	46.2	44.9	42.2	44.3	43.6	44.6	46.2	46.8	45.2	44.7
Time		9:57am	10:09am	10:20am	10:31am	10:43	10:57	11:15am	11:28am	11:40	11:58	12:12	12:27

AFRIC ENERGY REP'S Engr. Idara Sylvester Imonigang	QUATERNARY INT'L REP'S Emmanuel Johnson
DATE & SIGN 29/04/2026	DATE & SIGN 29/04/2026

Appendix C.3: Chain of Custody Record — Additional Sample Batch (Quaternary International Company Limited, April 2026)

**AIR QUALITY RESULT FOR THE PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA) OF THE
PROPOSED 2.5MMSCFD COMPRESSED NATURAL GAS (CNG) MOTHER STATION, IKOT OBIO OFFONG,
IBESIKPO ASUTAN L.G.A, AKWA IBOM STATE**

DATE: 29-04-2026

PARAMETERS	NMDPRA LIMIT	AF AQ13	AF AQ14	AF AQ15									
VOC ($\mu\text{g}/\text{m}^3$)	160	0.3	0.3	0.4									
NO ₂ ($\mu\text{g}/\text{m}^3$)	200	0.01	0.01	0.02									
SO ₂ ($\mu\text{g}/\text{m}^3$)	125	0.0	0.0	0.01									
CO ($\mu\text{g}/\text{m}^3$)	20	0.7	1.2	1.0									
CO ₂ (ppm)		501.0	528.0	540.0									
CH ₄ ($\mu\text{g}/\text{m}^3$)	NA	<0.001	<0.001	<0.001									
Temperature (°C)	25	23.4	23.8	24.1									
Relative Humidity (%)	NA	62.8	60.1	59.2									
Wind Speed (m/s)	NA	2.3	1.4	0.9									
Wind Direction	NA	SW	SW	SW									
SPM ₁₀ ($\mu\text{g}/\text{m}^3$)	250	3.00	4.00	4.00									
SPM ₅ ($\mu\text{g}/\text{m}^3$)	250	2.00	3.00	4.00									
SPM _{2.5} ($\mu\text{g}/\text{m}^3$)	250	2.00	2.00	3.00									
Noise Level dB(A)	85	47.1	58.4	61.5									
Time		12:42	12:58	13:35									

AFRIC ENERGY REP'S Engr. Idara Sylvester Imonigang	QUATERNARY INT'L REP'S Emmanuel Johnson
DATE & SIGN 29/04/2026	DATE & SIGN 29/04/2026

Appendix C.4: Chain of Custody Record — Final Sample Batch Documentation (Quaternary International Company Limited, April 2026)

CHAPTER 5

ASSOCIATED AND POTENTIAL ENVIRONMENTAL IMPACTS

5.1 Impact Significance Rating Key

Rating	Score	Colour	Interpretation
Negligible	1–2	Green	Impact barely detectable; no mitigation required beyond standard practice
Low	3–5	Green	Detectable but within limits; standard good practice is sufficient
Moderate	6–9	Amber	Noticeable impact; targeted mitigation and monitoring required
High	10–12	Red	Significant impact; formal mitigation programme and monitoring required
Very High	13–16	Dark Red	Critical impact; fundamental design change or project rejection may be warranted

Table 5.1: Impact Significance Rating Key

5.2 Significant Positive and Beneficial Impacts

5.2.1 Employment and Local Economic Development

Construction Phase — POSITIVE: MODERATE | Operational Phase — POSITIVE: MODERATE–HIGH

During construction, an estimated 120–180 direct jobs will be created over the 9-month construction period. A minimum of 60% of the unskilled and semi-skilled construction workforce will be recruited from the three host communities per AfricEnergy's Local Content Commitment. During the operational phase, the CNG Mother Station will create approximately 20–25 permanent direct jobs plus 30–40 indirect jobs in logistics, maintenance contracting, and supply chain. At the

prevailing wage rates for Akwa Ibom State, the operational payroll represents an estimated NGN 18–25 million per annum in direct wages to the local economy.

5.2.2 Energy Access and Diesel Displacement

POSITIVE: HIGH

The project directly supports Nigeria's Decade of Gas initiative and NGEP by bringing 2.5 MMSCFD of previously unmonetised/flared gas into productive use as transportation and industrial fuel. Benefits: CNG produces approximately 25% less CO₂ per unit energy than diesel; substantially less particulate matter and NO_x; CNG is approximately 40–60% cheaper per km than diesel for heavy vehicles; reduces Nigeria's diesel import bill; improves energy reliability for businesses; and contributes to Nigeria's NDC under the Paris Agreement.

5.2.3 Community Development and Social Investment

POSITIVE: MODERATE

AfricEnergy commits to a Community Development Programme (CDP) funded at minimum 2% of operational net revenue annually (NDDC-aligned). Priority areas identified through stakeholder consultation: scholarship programme (secondary and tertiary students from host communities); rehabilitation of access roads; primary healthcare facility support; vocational skills training in gas facility operations, welding, and electrical trades; and agricultural support programme for smallholder farmers on the site periphery.

5.3 Construction Phase Impacts

5.3.1 Air Quality — Construction Dust and Emissions

Pre-Mitigation: MODERATE (Score: 6) | Post-Mitigation: LOW (Score: 3)

Construction activities will generate fugitive dust from site clearing, topsoil stripping, earthworks, aggregate handling, and vehicle movements on unpaved haul roads. During the dry season, when Harmattan conditions already elevate background PM₁₀ levels (baseline: 2.31 µg/m³ on site, but 4.0 µg/m³ at control stations), construction dust has the potential to cause nuisance and minor health impacts at the nearest residential receptor approximately 800 m from the site. Diesel construction plant exhaust will generate localised NO₂, CO, and particulate matter but given the

small construction fleet and prevailing SW winds (directing emissions away from residential receptors during wet season), exhaust emission significance is assessed as Low. Mitigation: regular watering of unpaved haul roads and exposed soil (minimum twice daily); covering aggregate stockpiles and delivery vehicles; speed limits 10–15 km/h on unpaved internal roads; Tier 3 or higher-emission standard construction plant; prohibit >10-year-old equipment without EHSO waiver; schedule major earthworks during wet season where practicable.

5.3.2 Noise and Vibration — Construction

Pre-Mitigation: MODERATE (Score: 6) | Post-Mitigation: LOW (Score: 4)

Construction activities will generate noise from excavators, bulldozers, concrete mixers, angle grinders, and generators. Predicted construction noise levels at the site boundary: 68–75 dB(A) at peak activity. At the nearest residential receptor (~800 m): predicted 42–48 dB(A) daytime — within the FMEnv residential daytime limit of 55 dB(A). Vibration from heavy plant is assessed as Negligible at all sensitive receptors given the 800 m separation distance. Mitigation: restrict noisy works to 07:00–18:00 Monday–Saturday; no works on Sundays or public holidays without community agreement; noise-attenuated generators with exhaust silencers; community notification 48 hours before exceptionally noisy operations; acoustic hoarding (3 m) on community-facing boundary.

5.3.3 Soil Erosion and Land Degradation

Pre-Mitigation: MODERATE (Score: 8) | Post-Mitigation: LOW (Score: 4)

Site clearing, topsoil stripping, and grading will expose bare soil across approximately 4,000 m² (direct footprint), increasing susceptibility to erosion by rain splash and surface runoff. Akwa Ibom State's high-intensity rainfall events (June–July wet season peak, up to 380 mm/month) create significant erosion potential on exposed sandy loam soils. Uncontrolled erosion could result in siltation of the seasonal stream ~500 m from the site. Mitigation: phased site clearance; immediate stabilisation of disturbed areas (grass seeding and mulching); silt fences and sediment retention bunds along the site boundary downslope of the seasonal stream; lined stormwater drainage channels before earthworks commence; retention of a 20 m vegetated buffer strip along the

stream bank; topsoil stockpiling (separate from subsoil) for reuse in final restoration; daily inspection of erosion control measures during wet season.

5.3.4 Surface Water Quality — Construction

Pre-Mitigation: MODERATE (Score: 6) | Post-Mitigation: LOW (Score: 3)

Potential pathways for surface water contamination: sediment-laden runoff from disturbed soil; fuel and lubricant spills from construction plant; concrete washout water discharge; domestic wastewater from construction worker welfare facilities. The seasonal stream 500 m from the site is the primary receptor of concern. Mitigation: silt fences and settlement ponds; designated refuelling and maintenance areas with impermeable pads and drip trays; concrete washout areas remote from drainage pathways; welfare facilities with package sewage treatment plants; spill response kits at all fuel storage and handling locations.

5.3.5 Vegetation Clearance and Biodiversity

Pre-Mitigation: LOW (Score: 4) | Post-Mitigation: LOW (Score: 3)

Vegetation clearance will affect approximately 4,000 m² (direct footprint) of degraded secondary bush fallow dominated by *Chromolaena odorata* (invasive alien species) and pioneer grasses. No species of conservation concern are present within the direct footprint; no primary or mature secondary forest will be cleared; ecological value assessed as Low. Mitigation: pre-clearance walkover survey; clearance restricted strictly to approved 4,000 m² footprint; no vegetation removal outside marked site boundaries; no burning of vegetation; 3:1 replanting with indigenous species; post-construction landscaping of non-operational areas.

5.3.6 Traffic and Road Safety — Construction

Pre-Mitigation: MODERATE (Score: 6) | Post-Mitigation: LOW (Score: 3)

Construction will generate approximately 20–35 heavy vehicle movements per day at peak intensity on the Ikot Obio Offiong Road, which also carries community traffic (motorcycles, tricycles, pedestrians). Mobilisation route from Onne Port identified in PERA Map B. Mitigation: Construction Traffic Management Plan (CTMP) developed and agreed before construction with Akwa Ibom State Ministry of Works; heavy vehicle movements restricted to off-peak hours (09:00–

16:00) where possible; traffic marshals at site access point during peak deliveries; road surface maintenance responsibilities agreed with state authorities; Axle Load Management Plan; pre- and

post-construction road condition survey; AfricEnergy commitment to repair all damage attributable to construction traffic.

5.3.7 Community Health and Safety — Construction

Pre-Mitigation: MODERATE (Score: 6) | Post-Mitigation: LOW (Score: 3)

Construction risks: vehicle movements on public roads; dust and exhaust emissions; access of unauthorised persons to site; increased communicable disease risk from in-migration of construction workers (note: Akwa Ibom State's elevated HIV/AIDS prevalence of ~5.5%). Mitigation: perimeter hoarding and controlled site access with security personnel; community awareness campaigns on HIV/AIDS and STI prevention; health screening of workers; preferential local employment to minimise worker influx; welfare facilities meeting FMEnv and IFC PS2 standards; Worker Code of Conduct covering GBV and sexual exploitation.

5.3.8 Occupational Health and Safety — Construction Workers

Pre-Mitigation: HIGH (Score: 9) | Post-Mitigation: LOW (Score: 4)

Construction of industrial gas infrastructure involves: working at height during steel erection; lifting operations; noise and vibration exposure; manual handling; welding fumes and hot work; electrical installation; confined space entry during equipment installation. Without adequate controls, these carry risk of serious injury or fatality. Mitigation: formal HSE induction for all workers before site access; mandatory PPE (hard hat, safety boots, hi-vis vest, gloves, eye protection); permit-to-work system for all high-risk activities (hot work, confined space, working at height, lifting); HSE Officer on site at all times; daily toolbox talks; JSA for all non-routine tasks; first aid facilities and trained first aiders on site; incident reporting and investigation system; LTI target: zero.

5.4 Operational Phase Impacts

5.4.1 Air Quality — Operational Compressor Emissions

Pre-Mitigation: MODERATE (Score: 6) | Post-Mitigation: LOW (Score: 4)

Primary operational emission sources: (i) exhaust gases from natural gas engine-driven compressors (NO_x, CO, unburned hydrocarbons — these are minimised by using electric-drive compressors as the Preferred Alternative); (ii) fugitive methane emissions from valve stems, flanges, and connections; (iii) gas venting during maintenance activities. Methane (GWP of 28 over 100 years) represents the most significant climate-related operational impact. Estimated total annual fugitive methane emissions: less than 0.5 tonnes CO₂-equivalent per year based on industry benchmarks for well-maintained CNG facilities — a negligible contribution. Mitigation: electric-drive compressors (zero direct combustion NO_x/VOC); emergency diesel genset with oxidation catalyst; quarterly LDAR (OGI cameras, EPA Method 21); prompt repair within 15 days; zero routine flaring policy; annual stack emission testing.

5.4.2 Noise — Operational Compressors

Pre-Mitigation: MODERATE (Score: 8) | Post-Mitigation: LOW (Score: 4)

Typical unmitigated sound power levels for reciprocating compressors at 2.5 MMSCFD scale: 95–105 dB(A) at 1 m. Noise propagation modelling (ISO 9613-2) predicts that without attenuation, compressor noise could reach 48–54 dB(A) at the nearest residential receptor (~800 m), approaching or slightly exceeding the FMEnv residential daytime limit of 55 dB(A) and likely exceeding the night-time limit of 45 dB(A). This is the most significant operational environmental impact. Mitigation: acoustic enclosures achieving a minimum 15 dB(A) insertion loss; acoustic louvres on all enclosure ventilation openings; anti-vibration mounts on compressor skids; acoustic barriers (earthen berm with concrete face) on the north side facing the nearest residential area; post-commissioning noise verification survey at all sensitive receptors. With these measures, predicted noise at the nearest receptor reduced to approximately 38–42 dB(A) — within both FMEnv daytime (55 dB(A)) and night-time limits (45 dB(A)).

5.4.3 Soil and Groundwater — Operational Spill Risk

Pre-Mitigation: LOW–MODERATE (Score: 5) | Post-Mitigation: NEGLIGIBLE (Score: 2)

Operational contamination risk: lubricating oil spills from compressor maintenance; glycol chemical spillage; diesel fuel storage for backup generators; condensate accumulation from gas processing. Note: CNG itself (methane) is lighter than air and does not pose a soil contamination risk upon release. Mitigation: impermeable concrete bunded areas for all lubricant and chemical storage (minimum 110% of largest vessel capacity); drip trays under all compressor units and lube oil handling points; closed drainage system with oil-water separator; regular bund inspection; spill kits at all potential spill points; documented Spill Response Plan forming part of the ERP.

5.4.4 Waste Management — Operations

Pre-Mitigation: LOW (Score: 4) | Post-Mitigation: NEGLIGIBLE (Score: 2)

Operational waste streams: spent compressor lubricating oil (hazardous); used filter cartridges and oil-contaminated rags; domestic waste from ~15–20 permanent operations staff; wastewater from welfare facilities. Volumes are modest given the small operations workforce. Mitigation: Waste Management Plan (WMP); FMEEnv/NESREA-licensed hazardous waste contractor; waste segregation at source; records of all waste disposed for regulatory reporting; no burning of waste on site; wastewater treated in a package sewage treatment plant.

5.4.5 Community Health and Safety — Gas Hazard Risk

Pre-Mitigation: HIGH (Score: 10) | Post-Mitigation: LOW–MODERATE (Score: 5) — ALARP

The storage and handling of compressed natural gas at pressures up to 4,350 psig is the most significant community safety risk of the operational phase. Major accident hazard scenarios: BLEVE (catastrophic vessel rupture); high-pressure gas leak leading to flash fire or jet fire; gas dispersion leading to vapour cloud explosion; hose failure during tube trailer filling. At the current site geometry with the nearest residential receptor at approximately 800 m, major accident scenarios involving pressure vessel failure are not expected to produce lethal overpressure effects at the community boundary under credible release scenarios (confirmed by qualitative consequence analysis in HIRA). The nearest community is outside the modelled 1% lethality distance for all credible release scenarios. Residual significance assessed as Low–Moderate, reflecting inherent

residual risk managed to ALARP through: HAZOP-verified design; SIL-rated ESD/F&G systems; ASME-rated pressure vessels; NFPA 58/72-compliant fire detection and suppression; mutual aid agreement with AKSEMA; ERP rehearsed bi-annually; MEDEVAC agreement with UUTH.

5.4.6 Occupational Health and Safety — Operations

Pre-Mitigation: MODERATE (Score: 6) | Post-Mitigation: LOW (Score: 3)

Operational OHS hazards: high-pressure gas during tube trailer connection/disconnection; mechanical hazards from rotating compressor components; noise-induced hearing loss from prolonged exposure; chemical exposure to lubricants; confined space entry during vessel inspection. Mitigation: Operational HSE Management System (ISO 45001-aligned); hearing protection programme with acoustic enclosures first (engineering control), supplemented by mandatory hearing protection in designated noise zones; permit-to-work system; regular medical surveillance including audiometry; emergency response drills quarterly.

5.5 Decommissioning Phase Impacts

Decommissioning phase impacts are broadly similar to construction (noise, dust, traffic, community disturbance) with the additional consideration of hazardous material handling — decontamination and safe removal of gas storage vessels, compressors, and piping with residual hydrocarbons. Decommissioning impacts are assessed as Low to Moderate pre-mitigation and Low post-mitigation, consistent with the construction phase assessment, given the temporary nature of disturbance and the effectiveness of proposed controls. Full decommissioning commitments are detailed in Section 15.

5.6 Cumulative Impact Assessment

Air Quality (Cumulative — Net Positive): The CNG Mother Station's operational air emissions (primarily compressor exhaust NO_x) will add incrementally to the Uyo metropolitan airshed. However, CNG substitution for diesel across the distribution network served by this Mother

Station is projected to reduce net NO_x and PM_{2.5} emissions across the city — a net positive cumulative air quality impact over the operational life.

Traffic (Cumulative — Low–Moderate): The ongoing expansion of Uyo city contributes to cumulative traffic congestion. The Mother Station's operational traffic (8–12 tube trailer movements/day) adds modestly to this burden; the CTMP addresses this through route optimisation and peak-hour avoidance.

Community Development (Cumulative — Positive): The project's employment, skills development, and CDP commitments add positively to cumulative socioeconomic outcomes. Combined with the planned expansion of the CNG daughter station network, the project contributes to the cumulative clean energy transition of the Uyo/Ibesikpo Asutan region.

5.7 Consolidated Impact Register — All Project Phases

Impact	Phase	Pre-Mitig. Rating	Post-Mitig. Rating	Reversibility	Key Mitigation Reference
Air quality — construction dust	Const.	Moderate (6)	Low (3)	Reversible	Water suppression 2x/day; speed 15 km/h; dust screens; ESMP-A
Noise — construction plant	Const.	Moderate (6)	Low (4)	Reversible	07:00–18:00 works only; acoustic hoarding; ESMP-B
Soil erosion and surface runoff	Const.	Moderate (8)	Low (4)	Reversible	Phased clearing; silt fences; 20 m stream buffer; lined

					drainage; ESMP-C/D
Surface water contamination	Const.	Moderate (6)	Low (3)	Reversible	Bunded fuel storage (110%); spill kits; oil interceptors; ESMP-C
Vegetation clearance — biodiversity	Const.	Low (4)	Low (3)	Partially reversible	Clearing $\leq 4,000$ m ² ; no-burn; 3:1 replanting; ESMP-E
Traffic and road safety	Const.	Moderate (6)	Low (3)	Reversible	TMP approved before construction; flagmen; axle load management; ESMP-H
Worker H&S — construction	Const.	High (9)	Low (4)	Reversible	HSE Plan; PPE mandatory; JSA; toolbox talks; LTI target zero; ESMP-G
Community H&S — construction	Const.	Moderate (6)	Low (3)	Reversible	Exclusion zone; TMP; disease prevention; Worker

					Code of Conduct; ESMP-H
Air quality — operational emissions	Ops	Moderate (6)	Low (4)	Reversible	Electric compressors; LDAR quarterly (OGI); <500 ppm VOC at fence; ESMP-A
Noise — operational compressors	Ops	Moderate (8)	Low (4)	Reversible	Acoustic enclosures (≥15 dB(A) IL); anti- vibration mounts; post-commiss. survey; ESMP-B
Gas leak / fire / explosion hazard	Ops	High (10)	Low-Mod (5) ALARP	Managed	HAZOP; SIL-rated ESD/F&G; NFPA 58/72; mutual aid AKSEMA; ERP bi- annually; ESMP-G
Groundwater contamination risk	Ops	Low-Mod (5)	Negligible (2)	Reversible	Bunded containment (110%); drip trays; oil-water separator; bi-annual GW monitoring; ESMP- C

Waste management — operations	Ops	Low (4)	Negligible (2)	Reversible	Waste hierarchy; FMEEnv/NESREA-licensed contractor; monthly manifests; no burning; ESMP-F
Methane / GHG fugitive emissions	Ops	Moderate (6)	Low (4)	Reversible	LDAR monthly OGI; zero-routine-flaring; annual GHG inventory (ISO 14064); ESMP-J
OHS — operational workforce	Ops	Moderate (6)	Low (3)	Reversible	ISO 45001 OHSMS; permit-to-work; audiometry; medical surveillance; ESMP-G
Decommissioning — dust/noise/traffic	Decommiss.	Moderate (6)	Low (3)	Reversible	Decommissioning Management Plan; safe depressurisation; soil verification surveys
Employment — construction (POSITIVE)	Const.	Positive Moderate	Positive Moderate	—	60% local employment; skills register; local

					procurement programme
Employment — operations (POSITIVE)	Ops	Positive Moderate–High	Positive Moderate–High	—	60% local employment; CDP at 2% net revenue
Energy access / GHG benefit (POSITIVE)	Ops	Positive High	Positive High	—	2.5 MMSCFD CNG; 25% lower CO ₂ /unit energy; 40–60% cheaper than diesel; NDC contribution

Table 5.7: Consolidated Impact Register — All Project Phases. Pre-mitigation and post-mitigation significance ratings.

No impact residually HIGH or VERY HIGH.

CHAPTER 6

MITIGATION MEASURES AND ALTERNATIVES

6.1 Best Available Control Technology (BAT)

6.1.1 Air Quality BAT

- Electric-drive reciprocating compressors: zero direct combustion. Scope 1 NO_x/VOC emissions eliminated at source — most effective available technology for a CNG compression application
- Emergency diesel genset fitted with oxidation catalyst; Tier 4/Euro V exhaust emission standard; pre-mobilisation certification required; prohibit >10-year-old equipment
- LDAR programme: EPA Method 21 (OGI cameras) quarterly; target <500 ppm VOC at fence line; repair any detected leak within 15 days; zero-routine-flaring policy; total flaring events <5 hrs/year
- Continuous H₂S and methane detectors at facility boundary; 4-stage alarm system (1/5/10/20 ppm H₂S); automated ESD interlock at 20 ppm; zero odour complaints unresolved >24 hrs

6.1.2 Noise BAT

- Double-skinned acoustic enclosures on all compressor packages; minimum 15 dB(A) insertion loss; anti-vibration mounts on all rotating equipment; acoustic louvres on all ventilation openings
- Construction noise restricted to 07:00–18:00 Monday–Saturday; no pile-driving or heavy blasting on Sundays; acoustic hoarding (3 m) on community-facing boundary; community notification 48 hrs before high-noise activities

6.1.3 Water Management BAT

- Secondary containment bunding (minimum 110% vessel capacity) for all liquid hydrocarbon storage and handling areas; concrete impermeable plinths under all chemical storage
- Closed-loop condensate collection; oil-water separator at site drainage outlet; spill kits at 4 strategic locations throughout the facility

6.1.4 Waste Hierarchy — Best Practice

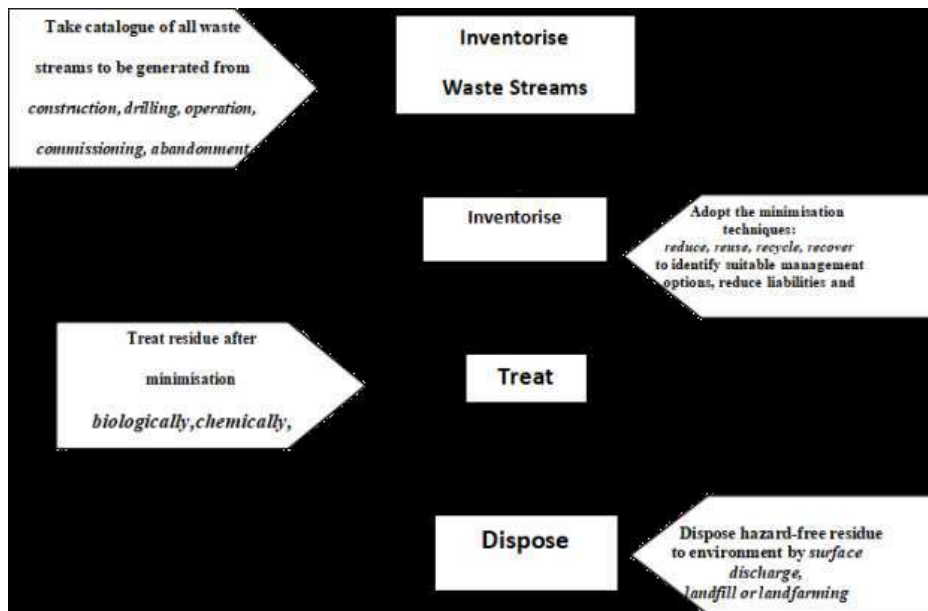


Figure 6.1.4: Waste Management Hierarchy — Inventorise Waste Streams → Minimise (reduce, reuse, recycle, recover) → Treat Residue (biologically, chemically) → Dispose Hazard-Free Residue (surface discharge, landfill, landfarming) (AfricEnergy Waste Management Plan framework)

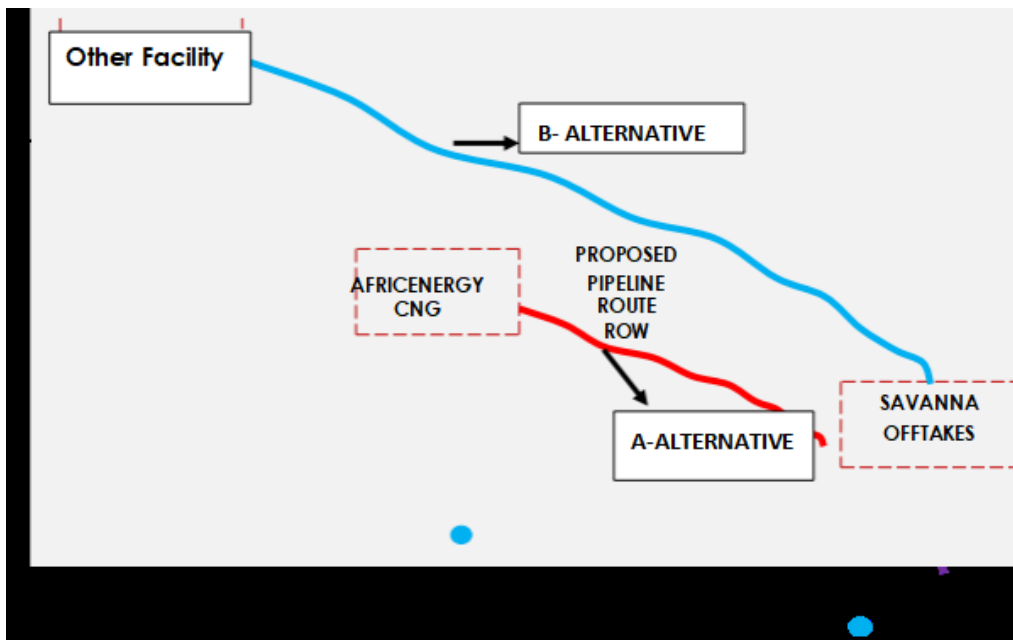
- Reduce: process efficiency optimisation; minimise lubricant and chemical consumption through preventive maintenance schedules
- Reuse: spent silica gel desiccant regenerated in twin-tower cycle; packaging materials reused where applicable
- Recycle: FMEEnv/NESREA-licensed recyclers for spent lubricating oil; metal scrap and copper wiring to licensed scrap dealers

- Dispose: all residual hazardous waste to FMEnv/NESREA-licensed disposal facility; no on-site incineration; monthly waste manifests retained for 5 years; annual waste audit submitted to FMEnv

6.1.5 Liability Compensation

Any property damage or crop loss directly attributable to construction activities will be assessed by an independent valuer and compensated in accordance with the Land Use Act (CAP L5 LFN 2004), Nigerian customary compensation principles, and IFC PS5 requirements. A documented compensation register maintained by the CLO will be made available to FMEnv on request.

6.2 Site Alternative / Location Analysis



Map 5: Pipeline Route Alternatives — Alternative A (Red: Savanna Offtakers to AfricEnergy CNG Plant — Preferred, ~450 m) vs Alternative B (Blue: Other Facility to AfricEnergy CNG Plant, ~3.5 km). Alternative A has minimal environmental footprint within the acquired land boundary.

Critical Factor	Alternative A — Savanna Offtakers (PREFERRED)	Alternative B — Other Facility
Pipeline Length	~450 m — entirely within the acquired land boundary; no additional ROW	~3.5 km — significant additional ROW, land acquisition, and environmental exposure
Environmental — Terrestrial Habitat	Minimal disruption of terrestrial habitats; near and minimal ROW corridors, less than 450 m ROW	Potential disruption of ecologically significant habitat; the pipeline would require over 1.5 km of ROW
Socioeconomic — Resettlement	Minimal to no resettlement required from areas of construction	Significant resettlement of people from areas of construction
Socioeconomic — Sabotage Risk	Minimal risk of sabotage; shortened ROW in secure area; cutoff from areas prone to sabotage	Significant due to great ROW length traversing community lands with conflict exposure
Economic Cost	Least expensive — easier installation; minimal land acquisition requirements	Most expensive — extended ROW, greater land acquisition, longer construction period
Environmental Sensitivity	Low — degraded land boundary within acquired site	Moderate — longer exposure of natural areas and community land
VERDICT	PREFERRED AND SELECTED	NOT PREFERRED — rejected

Table 6.2: Pipeline Route Alternatives — Critical Factors Comparison (Source: PERA Report Table 4.1)

Additionally, an alternative project site location in Eket LGA industrial corridor (Alternative C) was evaluated and found to present: longer gas gathering spur line (~4.2 km additional); increased land acquisition complexity; greater distance from Uyo city (primary CNG market); moderate ecological sensitivity (proximity to mangrove fringe). Alternative C is NOT PREFERRED.

6.3 Technology Alternatives — Compressor Drive Options

Comparison Factor	Electric Drive (PREFERRED)	Gas Engine Drive
GHG / Scope 1 Emissions	Indirect via grid; zero direct combustion Scope 1 NOx/VOC emissions from compression	Direct combustion NOx, CO, VOCs from gas engines throughout operations
Operational Noise	Significantly lower — electric motors far quieter than gas engines	Higher — combustion engine noise requires additional acoustic screening investment
Maintenance Complexity	Lower — no combustion engine overhaul cycle; simpler servicing	Higher — 8,000–12,000 hr engine overhaul cycle; more spare parts and skilled technicians
IFC PS3 Preference	Preferred — minimises Scope 1 air emissions; consistent with resource efficiency objectives	Acceptable but less preferred under IFC EHS Guidelines
Fuel Cost Stability	Stable utility electricity tariff	Gas fuel consumption ~5% of throughput; exposed to gas price variation

Capital Cost	Comparable for this scale; grid connection required	Comparable; no grid connection needed
VERDICT	SELECTED	Not selected

Table 6.3: Technology Alternatives — Compressor Drive Comparison

Technology Alternative D (LNG Micro-Liquefaction) was evaluated and rejected: capital cost 3.2–4.5× that of CNG; cryogenic hazard management substantially more complex; limited LNG transport tankers and skilled technicians in Akwa Ibom State; longer construction timeline (30–36 months vs 18 months for CNG). Technology Alternative E (LCNG Hybrid) was rated Acceptable but not preferred at this scale and market context.

6.4 No-Project Option

The No-Project Alternative assumes no construction and no CNG distribution network. Consequences: continued reliance on diesel generators and HFO combustion (CO₂, NO_x, SO₂, and particulate matter); denial of affordable clean energy access to Uyo consumers; loss of direct employment (120 construction jobs; 45 permanent operations positions); foregone fiscal revenue to Akwa Ibom State Government; continued dependence on imported petroleum products; failure to contribute to Nigeria's NDCs under the Paris Agreement and the Presidential CNG Initiative (2023). The No-Project Alternative is assessed as generating the most adverse net socioeconomic and environmental outcome and is firmly REJECTED.

6.5 Multi-Criteria Analysis of All Alternatives

Assessment Criteria	No Project (Alt A)	Proposed Site (Alt B)	Alt. Site (Alt C)	LNG Tech (Alt D)	LCNG (Alt E)	Reduced Scale (Alt F)
Energy Security Benefit	None	High	Medium	Medium	Medium	Low

GHG Emission Reduction	Moderate (no diesel replace.)	High	Moderate	Low	Moderate	Low
Environmental Sensitivity	High (status quo)	Low	Moderate	Low	Low	N/A
Infrastructure Proximity	N/A	High	Medium	High	High	High
Land Acquisition Ease	N/A	High	Low	High	High	High
Economic Viability	None	High	Medium	Low	Medium	Low
Technical Feasibility	N/A	High	High	Medium	Medium	High
Regulatory Compliance	N/A	High	High	Medium	High	High
Community Acceptance	N/A	High	Moderate	Low	Moderate	Low
Noise / Odour Impact	N/A	Low	Moderate	Low	Low	Low

Water Resource Impact	N/A	Low	Moderate	Low	Low	Low
Social Development Benefit	None	High	Moderate	Medium	Medium	Low
OVERALL RATING	Not Viable	PREFERRED	Acceptable	Not Preferred	Acceptable	Sub-optimal

Table 6.5: Multi-Criteria Analysis Matrix — All Alternatives (Source: PERA Report Table 7.1). Colour: Green = High/Preferred; Amber = Medium/Acceptable; Red = Low/Not Viable

6.6 Consolidated Impact Table with Corresponding Mitigation Measures

Impact	Phase	Pre-Mitig.	Residual	Mitigation Measure(s)
Air quality — construction dust	Const.	Moderate	Low	Water suppression min 2×/day; speed limits 15 km/h on site; dust screens; stockpiles covered; wheel wash at site exit; boundary TSP monitoring monthly
Noise — construction plant	Const.	Moderate	Low	Works 07:00–18:00 Mon–Sat only; acoustic hoarding (3 m) on community-facing boundary; noise-attenuated generators;

				community notification 48 hrs before high-noise activities
Soil erosion and runoff	Const.	Moderate	Low	Phased clearing; silt fences and sediment ponds; lined stormwater channels before earthworks; 20 m vegetated stream buffer; topsoil stockpiled separately
Surface water quality	Const.	Moderate	Low	Bunded fuel/chemical storage (110%); spill kits at all refuelling points; oil interceptors; package sewage treatment for welfare facilities; no concrete washout to drainage
Vegetation clearance — biodiversity	Const.	Low–Mod	Low	Clearing strictly limited to 4,000 m ² footprint; no-burn; pre-clearance survey; 3:1 replanting with indigenous species; zero vegetation removal outside marked boundary
Traffic and road safety	Const.	Moderate	Low	TMP approved before construction; flagmen at site access; axle load management; pre/post road condition survey; repair attributable damage within 30 days

Worker H&S — construction	Const.	High	Low	Construction HSE Plan; mandatory PPE; JSA for non-routine tasks; toolbox talks daily; trained first aiders on site; LTI target: zero
Community H&S — construction	Const.	Moderate	Low	Exclusion zone; TMP; community disease prevention; HIV/STI awareness campaign; Worker Code of Conduct covering GBV
Air quality — operational emissions	Ops	Moderate	Low	Electric-drive compressors; LDAR quarterly (OGI); repair leaks within 15 days; <500 ppm VOC at fence line; zero-routine-flaring
Noise — operational compressors	Ops	Moderate	Low	Acoustic enclosures (≥ 15 dB(A) IL); anti-vibration mounts; post-commissioning measurement at all sensitive receptors
Gas leak / fire / explosion	Ops	High	Low–Mod (ALARP)	HAZOP-verified design; SIL-rated ESD/F&G; ASME vessels; water deluge; NFPA 58/72; mutual aid AKSEMA; ERP rehearsed bi-annually; MEDEVAC with UUTH
Groundwater contamination	Ops	Low–Mod	Negligible	Bunded containment (110%); concrete plinths; drip trays; oil-water separator; bi-annual GW monitoring at 6 stations

Waste management	Ops	Low	Negligible	Waste hierarchy; FMEEnv/NESREA-licensed contractor; monthly manifests; no on-site burning; annual waste audit to FMEEnv
Methane / GHG emissions	Ops	Moderate	Low	LDAR monthly OGI; <0.5% fugitive loss target; zero-routine-flaring; annual GHG inventory (ISO 14064); third-party verification every 3 yrs
Community safety — gas hazard	Ops	High	Low–Mod	800 m buffer to nearest receptor; ERP; community emergency notification; AKSEMA mutual aid MOU before commissioning
Employment (POSITIVE)	Const.+Ops	Pos. High	Pos. High	60% local employment policy enforced; skills register; local procurement programme; CDP funded at 2% net revenue
Energy access / GHG benefit (POSITIVE)	Ops	Pos. High	Pos. High	2.5 MMSCFD CNG; 25% lower CO ₂ /unit energy vs diesel; NDC contribution; 40–60% lower fuel cost for consumers

Table 6.6: Consolidated Impact Table with Corresponding Mitigation Measures

CHAPTER 7

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

7.1 Introduction and Purpose of the ESMP

The Environmental and Social Management Plan (ESMP) is the operational instrument through which AfricEnergy and Infrastructure Limited commits to implement, monitor, and report on all mitigation measures identified in this EIA. The ESMP is prepared in compliance with: Nigerian EIA Act No. 86 of 1992 — Section 7(1)(b); NESREA Act 2007 and applicable National Environmental Standards Regulations (NESR); NMDPRA Environmental Guidelines and Standards (EGASPIN) 2nd Edition; IFC Performance Standard 1 (PS1); Equator Principles IV (2020) Principle 4; and World Bank Group EHS General Guidelines. This ESMP covers the full project lifecycle: pre-construction, construction, commissioning, operations, and decommissioning.

7.2 ESMP Objectives

1. Prevent, minimise, and where unavoidable, compensate for all significant adverse environmental and social impacts identified in Sections 12 and 13.
2. Provide AfricEnergy's management, contractors, regulatory authorities, lenders, and affected communities with a clear, practical, and verifiable environmental and social performance framework.
3. Ensure full compliance with applicable Nigerian law, NMDPRA technical standards, NESREA environmental regulations, FMEnv EIA conditions, and IFC Performance Standards PS1–PS8.
4. Establish the basis for the project's Environmental and Social Management System (ESMS: AfricEnergy/CNG/ESMS/2026/001), maintained throughout the operational life.
5. Demonstrate commitment to continuous improvement through systematic monitoring, internal auditing, and transparent public disclosure.

7.3 ESMP Management Programmes

Prog.	Management Programme	Scope
A	Air Quality Management	Construction dust, equipment exhaust, operational compressor emissions, fugitive VOC/CH ₄ , H ₂ S — construction and operations phases
B	Noise and Vibration Management	Construction noise, operational compressor noise, structural vibration — construction and operations phases
C	Water Resources and Drainage Management	Surface runoff, groundwater, produced condensate, stormwater management
D	Soil and Land Management	Topsoil conservation, hydrocarbon contamination prevention, erosion control
E	Ecology and Biodiversity Management	Vegetation clearance controls, wildlife protection, invasive species — IFC PS6 aligned
F	Waste Management	Construction waste, operational solid/liquid waste, hazardous waste, lube oil and chemical waste
G	Occupational Health, Safety and Emergency Response	Worker H&S, process safety (HAZOP/SIL), fire/explosion ERP, spill response, communicable disease

H	Social, Community and Labour Management	Community liaison, grievance mechanism, local employment, CDP, traffic management, Worker Code of Conduct
I	Cultural Heritage Management	Chance Find Procedure — NCMM notification protocol
J	Climate Change and GHG Management	GHG inventory, fugitive CH ₄ LDAR, climate resilience infrastructure

Table 7.3: ESMP Management Programmes and Scope

7.4 ESMP Mitigation and Management Matrix (Key Commitments)

Programme A — Air Quality:

- Water suppression on unpaved haul roads (minimum 2×/day during dry season); enclose stockpiles >5 m³; restrict vehicle speed to 15 km/h; wheel wash at site gate exit
- Tier 3 or equivalent low-emission diesel engines; pre-mobilisation engine certification; prohibit >10-year-old equipment without EHSO waiver; maintain engine service logs
- Electric-drive compressors (zero direct combustion); emergency diesel genset with oxidation catalyst; LDAR programme (EPA Method 21 monthly OGI); flare minimisation — no routine flaring; target <5 flaring events/year
- Gas analyser at inlet separator; continuous H₂S monitor at control room; 4-stage alarm (1/5/10/20 ppm); ESD interlock at 20 ppm; odour patrol; zero odour complaints unresolved >24 hrs.

Programme B — Noise and Vibration:

- Restrict noisy works to 07:00–18:00 Mon–Sat; no pile-driving or heavy blasting on Sundays; acoustic hoarding (3 m) on community-facing boundary; community notification 48 hrs before high-noise activities
- Acoustic enclosures on all compressor units (≥ 15 dB(A) IL); anti-vibration mounts; silencers on air/gas vents; HVAC outlet directed away from community; post-commissioning noise survey
- ISO 10816-compliant vibration monitoring on compressor skid; corrective action if RMS velocity > 4.5 mm/s; structural survey of nearest buildings at baseline, Year 1, Year 3

Programme C — Water Resources:

- Install silt fences and sediment traps before ground-breaking; bunded compound for fuel/chemical storage (110% capacity); oil interceptors at drainage outlets; daily bund inspection
- Concrete plinths under all chemical storage; lined sumps for condensate; monthly groundwater monitoring at 2 dedicated observation boreholes; bi-annual laboratory analysis
- Closed-loop condensate collection system; condensate to FMEEnv/NESREA-certified contractor for off-site treatment; zero direct discharge; monthly waste manifest records

Programme D — Soil Quality:

- Strip and stockpile topsoil separately from subsoil; cover stockpiles with geotextile; reinstate topsoil within 30 days of construction completion; reseed with native grass mix.
- Designated hard-standing refuelling areas; spill kits at all chemical handling points; 1-hour spill response time target; contaminated soil removed to a licensed facility within 30 days of discovery.

Programme E — Ecology and Biodiversity:

- Limit clearing to approved 4,000 m² footprint; IFC PS6 biodiversity screen confirms no critical habitat; retain buffer vegetation on eastern boundary; 3:1 replanting ratio for cleared trees; pre-clearance wildlife survey
- Hand-clearance where feasible; zero burning of vegetation; wildlife rescue protocol for any injured animals encountered; wash-down of imported construction materials to prevent invasive species

Programme F — Waste Management:

- Waste hierarchy applied (reduce→reuse→recycle→dispose); segregated waste bins (general, recyclable, hazardous); FMEEnv/NESREA-licensed contractor for hazardous waste; monthly manifests; target ≥70% diversion from landfill; no on-site burning

Programme G — Occupational Health, Safety and Emergency Response:

- HSE induction for all workers before site access; mandatory PPE; daily toolbox talks; JSA for all non-routine tasks; first aid personnel on site; LTI target: zero; TRIR <1.0 per 200,000 man-hours
- HAZOP completed pre-commissioning; SIL assessment on ESD system; written SOPs for all critical tasks; MOC process for any design change; annual process safety audit (NMDPRA-compliant)
- ERP maintained and rehearsed bi-annually with AKSEMA; full-scale emergency simulation annually; NFPA 58/72-compliant fire detection and automatic suppression; emergency assembly point clearly marked; MEDEVAC agreement with UUTH
- Spill response kits at 4 strategic locations; spill response team trained quarterly; NOSDRA notification within 24 hrs of any Tier 1 spill; SOPEP/SMPEP maintained; zero uncontrolled spills reaching drainage or watercourse

Programme H — Social, Community and Labour Management:

- Dedicated CLO appointed before construction; monthly community update meetings; Grievance Mechanism accessible to all through 5 channels; annual social performance report published publicly
- Minimum 40% unskilled and 20% semi-skilled labour from host communities; supplier registration programme; local content report quarterly; target $\geq 15\%$ of total procurement value from local suppliers
- CDP implemented per Community Investment Plan: scholarships (5/year), vocational training, health outreach, road rehabilitation, agricultural support; annual budget minimum 2% of net revenue; CDP Committee with community representatives
- Traffic Management Plan (TMP) approved before construction; flagmen at site access during peak hours; CNG tube trailers on designated haulage routes; max 20 heavy vehicle trips/day; pre/post road condition survey; repair attributable damage within 30 days

Programme I — Cultural Heritage:

- All construction workers briefed on Chance Find Procedure (CFP) at induction; any archaeological or cultural find: stop work immediately, fence area, notify NCMM within 24 hrs, await clearance before resuming; zero unauthorised disturbance of any finds

Programme J — Climate Change and GHG Management:

- Annual GHG inventory (Scope 1 and 2) per ISO 14064-1 and IPCC 2006 Guidelines; target Scope 1 $< 2,000 \text{ tCO}_2\text{e/year}$; LDAR to reduce fugitive CH_4 ; $< 0.5\%$ fugitive methane loss of throughput; third-party GHG verification every 3 years
- Infrastructure designed to withstand 100-year flood event; drainage capacity for 25 mm/hr rainfall intensity; climate projections for Akwa Ibom State reviewed at 5-year intervals and incorporated into maintenance schedules

7.5 Environmental and Social Monitoring Plan

Parameter	Location	Method / Standard	Frequency	Responsible	Action Level
TSP, PM₁₀, PM_{2.5}	3 site boundary points	Hi-Vol sampler; FMEEnv Standard	Monthly (Const.); Quarterly (Ops)	EHSO Manager	TSP >150 µg/m ³ → corrective action within 24 hrs
VOC / Fugitive CH₄ (LDAR)	Fence line + all compressor seals, flanges, valves	EPA Method 21; OGI camera survey	Monthly OGI + Quarterly full LDAR	EHSO + NMDPRA	Leak >500 ppm → repair within 15 days; NMDPRA notification
H₂S (ambient)	Site boundary + control room	Electrochemical sensor; DCS-linked continuous	Continuous	DCS Operator + EHSO	H ₂ S >1 ppm → investigate; >20 ppm → ESD activation
NO_x, CO (genset stack)	Genset exhaust outlet	Portable flue gas analyser; IS 4167	Quarterly	EHSO Manager	Any exceedance of NMDPRA stack emission limits →

					maintenance review within 48 hrs
Noise level LAeq dB(A)	3 sensitive receptor points (R1–R3)	IEC 61672 Class 1 sound level meter	Monthly (Const.); Quarterly (Ops)	EHSO Manager	Daytime >70 dB(A) at boundary → immediate abatement; >55 dB(A) at R2 → engineering review
Ground vibration PPV (mm/s)	Compressor skid + nearest community building	ISO 4866 seismograph; online sensor	Continuous (skid); Annual (building)	Maintenance Engineer	PPV >4.5 mm/s → machinery shutdown and inspection within 24 hrs
Groundwater: pH, TPH, BTEX, heavy metals	2 dedicated observation boreholes	ASTM D7363; NAFDAC-accredited lab	Monthly sample; Biannual lab analysis	EHSO + Accredited Lab	Any parameter exceeds NMDPRA limit → source investigation and report

					to FMEnv within 48 hrs
Surface drainage: O&G, TSS	Oil-water separator outlet	ASTM D7066; FMEnv Effluent Standard	Quarterly	EHSO Manager	O&G >10 mg/L → separator inspection and repair within 48 hrs
Stormwater quality	Site perimeter drainage outlet	Grab sample; field pH and turbidity meter	After significant rainfall (>25 mm event)	EHSO Manager	Visible sheen or abnormal turbidity → inspect for spill source
TPH, BTEX, heavy metals in soil	5 grid sampling points across facility	ASTM E1727; FMEnv Soil Quality Standards	Biannual	EHSO + Accredited Lab	TPH >1,000 mg/kg → soil remediation action plan within 30 days
Vegetation cover and invasive species	Site + 200 m buffer (line transects)	Standardised line transect survey	Biannual	Site Ecologist	New invasive species → removal plan within 30 days; IUCN CR species

					→ notify FMEnv
Wildlife observation — IUCN status	Site + buffer zone	Standardised transect count	Annual	Site Ecologist	Any IUCN CR species within 500 m → notify FMEnv; halt any works in vicinity
Grievance Mechanism status	Site + all host communities	GM register review and trend analysis	Monthly	CLO	<90% of grievances resolved within 30 days → escalation to AfricEnergy MD
Local employment % local content	HR and procurement records	Payroll and contract value audit	Quarterly	HR Manager + CLO	<40% local unskilled labour → mandatory recruitment review within 15 days
Community satisfaction	Host communities	Structured survey	Annual	CLO	<70% satisfaction

		(minimum 30 respondents)			→ community engagement action plan and senior management review
GHG inventory — Scope 1 and 2	Whole facility	ISO 14064-1; IPCC 2006 Guidelines	Annual	ESG Officer	Scope 1 >2,000 tCO ₂ e/yr → formal GHG reduction plan submitted to FMEnv
Methane fugitive loss rate	All gas handling equipment	EPA Method 21; OGI	Monthly OGI surveys	EHSO / ESG Officer	Loss rate >0.5% of throughput → immediate LDAR programme audit
LTI, TRIR, Near Miss rates	Site-wide	Incident reporting and rate calculation	Monthly	EHSO Manager	Any LTI → root cause analysis within 7

		(OSHA formula)			days; report to NMDPRA within 24 hrs
PPE compliance rate	Site-wide — random spot check	Unannounced audit (30-person sample)	Monthly	EHSO Manager	<95% compliance → mandatory re-training within 48 hrs; follow-up audit within 7 days

Table 7.5: Environmental and Social Monitoring Plan — Parameters, Methods, Frequency, Responsibility, and Action Levels

7.6 Roles and Responsibilities for ESMP Implementation

Party	Responsibilities	Key Deliverables
AfricEnergy Management (MD/Board)	Ultimate accountability for ESMP compliance; authorise ESMP budget; receive quarterly ESMP performance reports; interface with FMEnv/NMDPRA at senior level	Approve annual ESMP audit; sign regulatory submissions; approve emergency expenditure
EHSO Manager (AfricEnergy)	Day-to-day ESMP implementation oversight; manage monitoring programme;	Prepare all regulatory reports; maintain master monitoring database; lead incident

	compile monthly/quarterly reports; lead incident investigations; interface with FMEEnv/NMDPRA inspectors	investigations; approve contractor ESMP compliance
ESG Officer (AfricEnergy)	GHG inventory; IFC PS compliance tracking; ESG performance report compilation; stakeholder disclosure management	Prepare annual ESG Performance Report; coordinate third-party GHG verification
Community Liaison Officer (CLO)	Grievance Mechanism management; community meeting facilitation; CDP oversight; local employment monitoring	Monthly GM report; quarterly community summary; annual CDP impact report
Construction Contractor(s)	Implement all construction-phase ESMP commitments; maintain site EHSO Officer; submit weekly HSE statistics; comply with AfricEnergy ESMP requirements contractually	Weekly HSE report to AfricEnergy EHSO; monthly waste manifest; incident reports within 24 hrs
FMEEnv / NESREA / AKSEPA	Regulatory oversight; annual compliance inspection; receive monitoring reports; issue enforcement notices if required	Annual facility inspection; review monitoring reports; regulatory certification

NMDPRA	Technical regulatory oversight for gas compression operations; issue Operational Licence; review process safety documentation; inspection rights	Annual NMDPRA audit; process safety review; licence renewal
Third-Party Auditor (IFC/EP)	Independent annual ESMP audit; GHG inventory verification (every 3 yrs); validation of monitoring data; report to management and IFC	Annual ESMP audit report; GHG verification statement; public disclosure summary

Table 7.6: ESMP Roles and Responsibilities Matrix

7.7 ESMP Reporting Framework

- Weekly (Construction Phase): Contractor HSE statistics (LTI, near-miss, PPE compliance, waste generated) submitted to the AfricEnergy EHSO Manager every Monday morning
- Monthly: EHSO Manager prepares Monthly Environmental and Social Performance Report (MESPR) covering all monitoring parameters, incidents, grievances, and corrective actions; circulated to MD and Operations Manager
- Quarterly: Consolidated Quarterly ESMP Compliance Report to AfricEnergy Board; simultaneous Quarterly Environmental Compliance Report (QECR) submitted to FMEnv; includes KPI performance, trend analysis, and updated corrective action plan
- Annual: Annual ESMP Review Report reviewed by independent third-party auditor; submitted to FMEnv, NMDPRA, and IFC/EP financiers; publicly disclosed on AfricEnergy website within 60 days of year-end
- Regulatory Notifications: NOSDRA within 24 hrs of any Tier 1 or greater spill; NCMM within 24 hrs of any chance find; all LTIs reported to NMDPRA within 24 hrs; formal Incident Investigation Report within 7 days

Report Type	Contents	Recipient(s) and Timing
Weekly HSE Statistics	LTI count, TRIR, near-miss, PPE compliance, waste generated, incidents	AfricEnergy EHSO Manager — every Monday morning (Construction only)
Monthly ESPR (MESPR)	All monitoring parameters, incidents, grievances, corrective actions, environmental and social KPIs	AfricEnergy MD and Operations Manager — within 5 days of month-end
Quarterly ESMP Compliance Report	KPI performance against all ESMP targets; trend analysis; corrective action plan update	AfricEnergy Board and FMEnv (QECR) — within 30 days of quarter-end
Annual ESMP Review Report	Annual review against all ESMP targets; third-party verification; audit findings; GHG inventory	FMEnv, NMDPRA, IFC, public — within 60 days of year end
Incident Reports	Root cause analysis; corrective actions; regulatory notifications per NOSDRA/NMDPRA requirements	NMDPRA/FMEnv within 24 hrs (notification); formal report within 7 days
Community Performance Report	CDP expenditure; local employment %; grievance closure rate; community satisfaction survey results	Ikot Obio Offiong CDA and FMEnv — annually

Table 7.7: ESMP Reporting Framework

7.8 Grievance Mechanism

7.8.1 Purpose and Scope

The AfricEnergy Grievance Mechanism (GM) provides a structured, accessible, culturally appropriate, and transparent process through which affected community members, workers, and other stakeholders may raise concerns about the project's environmental, social, or operational performance. The GM is established per IFC PS1 (paragraphs 29–35) and the UN Guiding Principles on Business and Human Rights (UNGPs).

Channels:

- (1) Written submission — Grievance Box at Ikot Obio Offiong CDA office and project site gate
- (2) Verbal — CLO during community meetings or on request
- (3) Telephone — dedicated project grievance hotline (to be published before construction)
- (4) Electronic — project email dedicated to grievances
- (5) Anonymous — all channels accept anonymous submissions.

The No Retaliation Policy: Any retaliation against a complainant constitutes gross misconduct and is subject to disciplinary action up to and including dismissal.

Step	Stage	Process and Timeline
1	Logging — Receipt & Acknowledgement	CLO logs grievance in GM register within 24 hours; assigns unique reference number; acknowledges receipt to complainant within 5 working days
2	Investigation	EHSO Manager or CLO investigates; site inspection and consultation with relevant staff; preliminary findings within 15 working days

3	Resolution Proposal	Resolution proposal communicated to complainant within 30 calendar days; if accepted, grievance closed and documented
4	Escalation	If unresolved within 30 days or complainant disagrees, escalation to AfricEnergy MD and Community Elders/CDA for mediation
5	External Resolution	If internal resolution fails, complainant may approach FMEnv, NESREA, AKSEPA, or pursue legal remedies; AfricEnergy does not penalise use of external channels
Policy	No Retaliation Policy	Any retaliation against a grievance complainant constitutes gross misconduct and is subject to disciplinary action up to and including dismissal

Table 7.8: Grievance Resolution Process and Timeline

7.9 Emergency Response and Preparedness

An Emergency Response Plan (ERP) shall be developed, maintained, and rehearsed per NMDPRA Emergency Response Regulations, NFPA 58, and World Bank Group EHS Guidelines. Credible emergency scenarios addressed: major gas release/uncontrolled venting; fire and explosion — process area or storage; hydrocarbon spill; medical emergency; community incident or security threat; extreme weather event (flooding, severe storm).

- Emergency Organisation Chart with named roles and alternates; 24/7 on-call EHSO officer
- Mutual Aid Agreement with Akwa Ibom State Emergency Management Agency (AKSEMA) and State Fire Service — to be executed before commissioning
- NOSDRA emergency notification procedures integrated into spill response protocol
- Emergency Assembly Point (EAP) clearly marked and communicated to all personnel and contractors

- Medical evacuation (MEDEVAC) agreement with University of Uyo Teaching Hospital (UUTH)
- Full ERP drill minimum twice per year; tabletop exercise once per year; after-action review and ERP update within 30 days of each drill

7.10 IFC Performance Standards Compliance Summary

PS	Title	ESMP Response / Key Provisions
PS 1	Assessment & Management of E&S Risks	ESMP (this section) constitutes the ESMS; corrective action protocol; monitoring programme; annual third-party audit; grievance mechanism (Section 15.8)
PS 2	Labour and Working Conditions	Worker Code of Conduct; OHS management (ESMP-G); local employment targets; no-retaliation policy; worker grievance channel within GM; HR audit quarterly
PS 3	Resource Efficiency and Pollution Prevention	LDAR programme; electric compressor drives; zero routine flaring; GHG inventory (ESMP-J); waste hierarchy (ESMP-F); stormwater management; closed-loop condensate
PS 4	Community Health, Safety and Security	ERP (Section 15.9); TMP; community notification protocols; H ₂ S alarm system; MEDEVAC agreement with UUTH; accident hazard risk managed to ALARP
PS 5	Land Acquisition and Involuntary Resettlement	No involuntary resettlement: site acquired via willing-seller C-of-O; no physical displacement; RAP not required; economic displacement monitoring via community satisfaction survey

PS 6	Biodiversity Conservation	IFC PS6 biodiversity screen confirms no critical habitat; vegetation clearing limited to 4,000 m ² ; 3:1 replanting commitment; wildlife rescue protocol; biannual ecology monitoring
PS 7	Indigenous Peoples	No Indigenous Peoples communities identified within zone of influence per IFC PS7 definition; engagement conducted under PS1/PS4 framework
PS 8	Cultural Heritage	Chance Find Procedure (ESMP-I); NCMM notification protocol; no known heritage sites within the project footprint per baseline survey

Table 7.10: IFC Performance Standards Compliance Summary

7.11 Indicative ESMP Budget

ESMP Cost Item	Construction (NGN)	Ops Year 1 (NGN)	Ops Yr 2–3 p.a. (NGN)
Environmental Monitoring (lab analysis, equipment)	12,000,000	8,400,000	8,400,000
EHSO Manager & ESG Officer (salaries + overheads)	24,000,000	18,000,000	18,000,000
Community Liaison Officer (CLO)	8,400,000	8,400,000	8,400,000
Community Development Programme (CDP)	—	15,000,000	15,000,000
Third-Party ESMP Audit	—	6,000,000	6,000,000

GHG Inventory and Third-Party Verification	—	4,200,000	4,200,000
Emergency Response Equipment and Drills	9,600,000	4,800,000	4,800,000
Waste Management (contractor costs)	6,000,000	4,800,000	4,800,000
Ecological Monitoring and Replanting	4,800,000	2,400,000	2,400,000
LDAR Programme (equipment + surveys)	—	6,000,000	6,000,000
Regulatory Fees (FMEnv, NMDPRA, NOSDRA)	3,600,000	2,400,000	2,400,000
Contingency (15%)	10,560,000	9,033,000	9,033,000
TOTAL	84,960,000	89,433,000	89,433,000

Table 7.11: Indicative ESMP Budget (NGN). All figures subject to revision based on final contractor procurement and regulatory fee schedules.

CHAPTER 8

REMEDIATION PLANS AFTER DECOMMISSIONING

8.1. Introduction and Purpose

Although the CNG Mother Station is designed for a 25-year operational life, the EIA treats decommissioning as a distinct project phase requiring its own planning, impact assessment, and management commitments. The underlying logic is straightforward: a facility that compresses, stores, and dispenses natural gas at high pressure cannot simply be abandoned at the end of its useful life. Pipework and vessels will still contain residual hydrocarbons; the site will have been used industrially for decades; and the host community and regulators need assurance that the land will not be left in a degraded or contaminated state. This chapter therefore sets out what AfricEnergy commits to do, and when to close the facility safely, restore the site, and remain accountable for its condition for a defined period afterward.

The remediation and decommissioning provisions serve three linked purposes: (i) protecting workers and the surrounding community from residual physical and chemical hazards during dismantling; (ii) restoring the soil, groundwater, and ecology of the site so that it can return to its prior land use or an agreed alternative; and (iii) giving regulators (FME and NMDPRA) and the project's financiers verifiable evidence, through audits, surveys, and reports that closure has been completed to the required standard.

8.2. Timing and Planning Horizon

The EIA builds in a long lead time for decommissioning planning, reflecting the scale and technical complexity of safely closing a pressurised gas facility. Three planning milestones are specified, each triggered by a different event or threshold:

Planning Document	Trigger	Lead Time Before Closure
Decommissioning Plan	Planned cessation of operations at the end of the facility's design life	Not less than 3 years

Decommissioning Management Plan (DMP)	Anticipated end-of-life, or receipt of a regulatory notice requiring decommissioning	No later than 5 years
Community consultation on decommissioning	Scheduled decommissioning date	No later than 2 years

Table 8.2: Decommissioning Planning Milestones and Lead Times

The longer lead time for the DMP (5 years) compared with the Decommissioning Plan (3 years) reflects the fact that the DMP is the more detailed operational document — it needs to translate the high-level concept into a sequenced, fully resourced closure programme, including the financial and contractual arrangements (recyclers, licensed waste contractors, environmental auditors) that take time to put in place. The 2-year minimum for community consultation ensures that the host community is not presented with a finished plan but is engaged early enough to influence decisions about timing, traffic routing during dismantling, and the proposed end use of the land.

8.3. Decommissioning Activities — Making the Site Safe

Before any structure can be physically removed, the facility has to be brought to a safe, de-energised state. This sequencing matters: attempting to dismantle pressurised equipment before it has been depressurised and purged is one of the most common causes of serious incidents during industrial decommissioning. The EIA's commitments are structured to enforce this sequence:

8.3.1 Depressurisation and Isolation

- Safe depressurisation and purging of all process equipment and pipelines — this removes the stored energy (compressed gas) and clears any residual hydrocarbon vapour before hot work or cutting begins

- Isolation and blinding of all pipeline tie-in points — physically disconnecting the facility from the live Savanna gas supply so that decommissioning work cannot inadvertently expose workers to an active gas source
- All of this is to be carried out under a written Safe System of Work, meaning the sequence, permits, and checks are documented and signed off before work proceeds, not left to informal practice on site

8.3.2 Physical Removal

- Removal of all above-ground process equipment, storage vessels, and piping
- Excavation and removal of the 450-metre buried inlet pipeline that connects the facility to the Savanna header — this is treated as a discrete activity because it involves reopening a buried trench across the original pipeline route, with its own ground disturbance and reinstatement implications distinct from above-ground equipment removal

8.3.3 Materials Recovery and Hazardous Waste Disposal

Decommissioning generates two broad categories of material that are handled differently:

- Recoverable materials — steel structures, compressor components, and copper wiring are to be recycled through registered metal recyclers rather than disposed of as waste, reflecting both the economic value of these materials and the waste-minimisation principle applied throughout the project
- Hazardous materials — any legacy asbestos that may be present in older components, lubricant-contaminated soil, and waste chemicals are explicitly called out as requiring disposal through FMEnv, NESREA-licensed contractors, rather than general waste handling, given their potential to cause harm if mishandled

8.4. Soil and Groundwater Remediation

A central concern at any industrial closure is whether the site has been contaminated by years of operation, lubricant leaks, condensate, or fuel storage are the most plausible pathways at this type of facility. Rather than assuming contamination either way, the EIA commits to a verify-then-act approach:

- Soil and groundwater verification surveys are conducted both before and after equipment removal. The 'before' survey establishes the condition of the site at the point operations cease (which may already reflect any historical leaks or spills); the 'after' survey checks that the removal process itself has not introduced new contamination, and confirms the baseline against which any remediation is judged to be complete
- Where contamination is identified, soil sampling and remediation of any hydrocarbon-contaminated soil is undertaken, to return conditions to background levels — i.e., consistent with undisturbed soil in the surrounding area — or to FMEEnv's site-specific target values where background levels are not achievable or not the appropriate benchmark
- Underground structures that cannot practically be excavated and removed (for example, deep foundations or buried sumps) are capped in place rather than left exposed, to prevent them acting as a future pathway for water ingress or ground instability

This two-survey approach is a meaningful commitment because it creates an auditable record: a regulator or financier reviewing the closure documentation can see exactly what condition the site was in before and after the heaviest physical disturbance, rather than relying on a single end-of-process assessment.

8.5. Site Restoration

Once equipment has been removed and any necessary remediation completed, the site is restored. The stated objective is to return the land to its pre-project use — in this case, land consistent with the surrounding degraded scrubland/bush fallow — or to an alternative use agreed with the host community and relevant authorities. This flexibility matters in practice: by the time the facility reaches end-of-life (potentially decades from now), community needs or local development plans may have changed, and the restoration plan is not fixed to recreate exactly the pre-2026 condition of the land if a different, agreed use would better serve the community at that time.

Physical restoration activities include:

- Site grading and topsoil reinstatement, reversing the levelling and compaction associated with the original construction and ongoing operations
- Capping of any underground structures left in place
- Revegetation using local plant species, consistent with the no-burn, indigenous-species approach used during the original construction phase, so the restored vegetation is ecologically appropriate to the area rather than an arbitrary planting scheme

8.6. Post-Closure Monitoring

Restoration work finishing is not treated as the end of AfricEnergy's responsibility. Environmental monitoring continues for a minimum of two years after site restoration is complete. This monitoring period exists because some forms of contamination or ecological recovery only become apparent over time; for instance, residual contamination can migrate slowly through soil or groundwater, and revegetation needs at least one or two growing seasons to demonstrate it has taken hold successfully. A single point-in-time inspection at the moment restoration work finishes would not capture these slower processes.

8.7. Financial Assurance

A decommissioning and remediation programme of this kind only has force if the money to carry it out is guaranteed to be available when needed, potentially 20 years or more after the commitments are first written down, when the original project finance may have long since been repaid, and circumstances may have changed. The EIA addresses this directly:

- The costs of decommissioning are provisioned for in the project's financial model from the outset, in accordance with IFC Performance Standard requirements, rather than being treated as a cost to be worked out later
- Financial assurance is to be established through a dedicated, ring-fenced fund or a performance bond, a ring-fenced fund sets aside money specifically for this purpose so it cannot be diverted to other uses, while a performance bond is a third-party financial guarantee that pays out if the company fails to carry out the closure work itself

- This financial provision is reviewed annually starting from Year 5 of operations, allowing the amount set aside to be adjusted over time as cost estimates, inflation, or regulatory requirements change, rather than being fixed once and left unexamined for two decades

8.8. Consultation and Regulatory Reporting

Decommissioning is not treated as a purely technical or internal matter. All decommissioning activities are to be conducted in consultation with the Ikot Obio Offiong host community, Ibesikpo Asutan Local Government Area, FME, and NMDPRA. Community consultation specifically begins at least two years before the scheduled decommissioning date, long enough for residents to be informed of, and have input into, matters such as the timing of heavy traffic during dismantling, expectations around noise and dust (similar to the original construction-phase concerns), and the proposed future use of the land once restored.

On the regulatory side, the closure process concludes with a final environmental audit and a decommissioning completion report, submitted to FME, NMDPRA, and the project's International Financial Institution (IFI) financiers. This gives each of those parties- the domestic environmental regulator, the sector regulator, and the lenders who financed the project, independent confirmation that closure has been completed to the agreed standard, rather than relying solely on AfricEnergy's own assurance.

8.9. Consolidated Summary of Commitments

Stage	Commitment	Timing
Planning	Decommissioning Plan prepared	Not less than 3 years before planned cessation
Planning	Decommissioning Management Plan (DMP) prepared	No later than 5 years before end-of-life, or on regulatory notice

Planning	Financial assurance fund/performance bond established and reviewed annually	From Year 5 of operations
Pre-Decommissioning	Community consultation on decommissioning plans commences	No later than 2 years before scheduled decommissioning
Decommissioning	Safe depressurisation and purging of vessels and pipework under a written Safe System of Work	Before any dismantling
Decommissioning	Isolation and blinding of pipeline tie-in points; removal of above-ground equipment, vessels, and piping; excavation and removal of the 450 m inlet pipeline	During decommissioning works
Decommissioning	Recycling of steel, compressor components, and copper wiring; disposal of hazardous materials (legacy asbestos, contaminated soil, waste chemicals) via NESREA-licensed contractors	During decommissioning works
Remediation	Soil and groundwater verification surveys before and after equipment removal	Before and after equipment removal
Remediation	Remediation of any contaminated soil to background levels or NESREA site-specific target values	As required, following verification surveys

Restoration	Site grading, topsoil reinstatement, capping of remaining underground structures, and revegetation with local species	Following remediation
Post-Closure	Post-closure environmental monitoring	Minimum 2 years after site restoration
Closure	Final environmental audit and decommissioning completion report submitted to NESREA, NMDPRA, and IFI financiers	On completion of restoration

Table 8.9: Consolidated Decommissioning and Remediation Commitments by Stage and Timing

8.10. Impact Significance and Overall Assessment

The EIA's impact assessment treats decommissioning as broadly comparable to the construction phase in terms of the nature of disturbance it causes, noise, dust, and traffic affecting the surrounding community, but adds one further dimension: the safe handling of hazardous material during the dismantling and removal of gas storage vessels, compressors, and associated piping that will still contain residual hydrocarbons at the point of closure. This is the one respect in which decommissioning carries a distinct risk profile from construction, since construction does not involve removing equipment that has spent years holding pressurised gas.

Taking into account the mitigation, remediation, and monitoring commitments described above, decommissioning phase impacts are assessed as Low to Moderate before mitigation and Low after mitigation — the same rating arrived at for the construction phase. The reasoning given is that the disturbance involved is temporary, and the controls proposed (the phased safety sequencing, the verification surveys, the financial assurance, and the post-closure monitoring) are judged effective at reducing the residual impact to a low level.

STAKEHOLDER ENGAGEMENT

INTRODUCTION

Stakeholder engagement is a fundamental component of the Environmental Impact Assessment process for the AfricEnergy 2.5 MMSCFD CNG Mother Station. Meaningful consultation ensures that the concerns, values, and interests of affected communities and relevant institutions are identified, documented, and appropriately considered in project planning and decision-making. The engagement process has been designed to comply with: FMEnv EIA Procedural Guidelines (2011); NMDPRA stakeholder consultation requirements; IFC Performance Standard 1; IFC Performance Standard 5 (Land Acquisition); and Equator Principles IV (EP4). The process was iterative, commencing at the project scoping stage and continuing through baseline data collection and impact assessment, with provisions for ongoing engagement during construction and operations.

STAKEHOLDER IDENTIFICATION AND MAPPING

Methodology for Stakeholder Identification

Stakeholders were identified through a structured mapping exercise employing: desktop review of administrative records for Ikot Obio Offiong community and Uyo LGA; consultations with the Akwa Ibom State Ministry of Environment and Mineral Resources (AKSMEMR); key informant interviews with community leaders, traditional rulers, and women's and youth group representatives; review of relevant government agency mandates; and site reconnaissance visits in March–April 2026. Stakeholders were categorised into three primary groups: directly affected parties, indirectly affected parties, and interested parties, consistent with IFC PS1 definitions.

Stakeholder Categories and Engagement Rationale

Category	Stakeholder Group	Basis of Interest / Engagement Rationale
Directly Affected	Ikot Obio Offiong Community —	Nearest receptor; potential ambient air quality, noise, and traffic impacts during construction and operations

	residents within 800 m radius	
Directly Affected	Landowners / Land custodians in project footprint area	Land use and access; right-of-way considerations; compensation if applicable
Directly Affected	Local farmers and artisanal users of adjacent scrubland	Temporary disruption to access routes and marginal scrubland use
Directly Affected	Women's groups and youth associations within community	Vulnerable and underrepresented populations; livelihood and employment interests
Indirectly Affected	Uyo Local Government Area Administration	Local governance, road infrastructure, and community liaison obligations
Indirectly Affected	Akwa Ibom State Ministry of Environment & Mineral Resources (AKSMEMR)	State environmental oversight and parallel state EIA approval authority
Indirectly Affected	NMDPRA — Technical Standards Division	Sector regulator; CNG facility permits and operational approvals
Indirectly Affected	NESREA — South-South Regional Office, Port Harcourt	Federal environmental compliance and EIA review monitoring

Interested Parties	Nigerian Gas Marketing Limited (NGML) — Gas Supply Division	Gas supply chain; GSPA and Comfort Letter relationship
Interested Parties	Civil Society Organisations — Akwa Ibom-based environmental NGOs	Independent observation and community advocacy
Interested Parties	Media — local and state press	Public information dissemination; EIA public hearing announcements
Interested Parties	Financial Institutions / Investors (BOI, potential lenders)	Environmental and social due diligence requirements; IFC/EP Category A review

Table ST-1: Stakeholder Categories and Engagement Rationale

Engagement Principles and Methods

Principles of Engagement

- Free, Prior, and Informed Consultation (FPIC-aligned): all consultations conducted without coercion; communities provided accessible project information in advance in English and Ibibio (local language)
- Inclusivity and Cultural Sensitivity: engagements conducted bilingually; female participation specifically encouraged; separate FGDs for women and youth
- Transparency: project information including potential impacts, proposed mitigation, and EIA process rights, is disclosed openly using illustrated display boards and bilingual handouts

- Responsiveness: all concerns and grievances are documented and formally responded to with commitments tracked in the stakeholder engagement log
- Continuity: engagement is an ongoing obligation throughout the project lifecycle — not limited to the EIA preparation phase

Engagement Methods Employed

Method	Target Stakeholder(s)	Dates / Period
Community Town Hall Meetings (×2)	Ikot Obio Offiong community (all adults)	18–19 March 2026 — 147 attendees (men: 78, women: 52, youth: 17)
Focus Group Discussions (FGDs)	Women's Development Association (22 participants); Youth Development Forum (14 participants)	20 March 2026
Key Informant Interviews (KIIs)	HRH Eteidung Emmanuel Udoh Ekanem (Traditional Ruler); Mr. Akpan Okon (Community Secretary); Cllr. Grace Effiong (Ward Councillor)	17 March 2026
Institutional Consultations	FME South-South Regional Office; NMDPRA Technical Standards; AKSMEMR; Uyo LGA; NGML Gas Supply Division	February–April 2026

Non-Technical Summary (NTS) Distribution	Community members, local government offices, health facility managers	March 2026 — bilingual (English/Ibibio) handouts with illustrated display boards
Written Notices and Information Disclosure	Landowners, adjacent property holders	February 2026 (pre-scoping)
PERA Household Surveys	100 households — socioeconomic baseline data collection	29–30 April 2026
Grievance Mechanism (project register)	All stakeholders — community grievance boxes at CDA office and site gate	Operational from March 2026 — ongoing

Table ST-2: Stakeholder Engagement Methods Employed

Community Consultations

Town Hall Meeting — Ikot Obio Offiong Community Hall, 18–19 March 2026

Two town hall meetings were held at the Ikot Obio Offiong Community Hall on 18 and 19 March 2026, facilitated by the AfricEnergy Community Liaison Officer in collaboration with the community's Traditional Ruler's Council. Attendance: approximately 147 community members across both sessions (men: 78; women: 52; youth: 17). Representatives from the Uyo LGA Community Development Department attended as observers.

Information presented via illustrated display boards and bilingual (English/Ibibio) handouts: overview of the CNG Mother Station project and proposed location on the ~2.5-hectare degraded scrubland site; construction timeline (estimated 18 months for Phase 1); employment and local procurement opportunities; potential environmental impacts (air quality, noise, traffic) and

proposed mitigation measures; the ESMP and the project Grievance Mechanism; and the EIA process and community rights to raise objections or request information.



Plate 4.6: Community leaders and Traditional Ruler's Council representatives at the pre-consultation meeting, Ikot Obio Offiong, March 2026



Plate 4.7: AfricEnergy Community Town Hall Meeting — team presenting the CNG project to Ikot Obio Offiong community members (March 2026; 147 attendees over two sessions)



Plate 4.8: Focus Group Discussion — community members engaging with AfricEnergy social specialists on employment commitments, water quality, and safety concerns

Focus Group Discussions — 20 March 2026

- Women's Development Association of Ikot Obio Offiong (22 participants): Discussion focused on livelihood impacts, access to water sources (noting the community's reliance on boreholes and the risk of groundwater contamination), health and safety concerns related to gas infrastructure, and community social investment (CSI) expectations including healthcare and borehole provision
- Youth Development Forum (14 participants): Discussion focused on employment opportunities and the Local Employment Policy commitment; skills development and vocational training expectations; environmental concerns about noise and dust during construction; and cultural heritage protection

Key Informant Interviews — 17 March 2026

- HRH Eteidung Emmanuel Udoh Ekanem — Traditional Ruler, Ikot Obio Offiong: Expressed support for the project in principle, subject to community benefit agreements and employment commitments. Requested formal documentation of commitments before construction commences.

- Mr. Akpan Okon — Community Secretary: Requested that AfricEnergy provide a detailed community development plan — including specific commitments on infrastructure, healthcare, and scholarships — before commencing construction.
- Cllr. Grace Effiong — Ward Councillor: Raised concerns regarding road damage from heavy construction vehicles on the community access road and requested binding road rehabilitation commitments with pre- and post-construction surveys.



Plate 4.9: Household socioeconomic surveys and Key Informant Interviews (KII) conducted during the PERA field campaign at Ikot Obio Offiong, April 2026 (100-household questionnaire; parameters: demographics, income, livelihoods, health, water, infrastructure)



Plate 4.10: AfricEnergy environmental and social field survey team at the proposed project site — Ikot Obio Offiong, Ibesikpo Asutan LGA, April 2026

Issues Raised and AfricEnergy Responses

No.	Issue / Concern Raised	Source	AfricEnergy Response and Commitment
1	Risk of gas explosion or fire from the CNG station	Community town hall; Women's FGD	Detailed explanation of CNG safety standards (ASME B31.8; NMDPRA regulations). Commitment to install certified safety and ESD systems; fire detection and suppression systems; and exclusion zones per NMDPRA requirements. Emergency Response Plan to be shared with the community before commissioning. MEDEVAC agreement with UUTH to be executed.
2	Employment preference for local community members during construction and operations	Youth FGD; Town hall	AfricEnergy committed to a Local Employment Policy: minimum 40% of unskilled and semi-skilled construction labour from Ikot Obio Offiong and adjacent communities. A Skills Register will be established prior to construction mobilisation. Minimum 60% of permanent operations positions filled by qualified persons from host community and LGA.
3	Dust and air quality impacts during construction	Town hall; Women's FGD	Mitigation measures in the ESMP: daily water suppression on unpaved areas (2×/day); speed limits 15 km/h; dust monitoring at site boundary. Residents within 200 m will receive advance notice of high-dust activities. TSP monitoring results shared quarterly with community.

4	Noise levels from construction activities, particularly at night	Town hall; KII (Traditional Ruler)	Construction restricted to daylight hours (07:00–18:00 on weekdays); no night construction unless emergency and community-agreed. Noise monitoring at the nearest residential receptor (~800 m). Results shared quarterly with community CLO.
5	Road damage from heavy construction vehicles on the community access road	KII (Ward Councillor)	Pre-construction road condition survey to be conducted and documented. AfricEnergy will repair all damage directly attributable to construction traffic to pre-existing condition or better within 30 days of construction completion. Axle Load Management Plan (ALMP) to be implemented.
6	Request for community social investment: health centre upgrade and borehole provision	Women's FGD; Community Secretary KII	AfricEnergy committed to developing a Community Development Agreement (CDA) with Ikot Obio Offiong community prior to construction. CSI priorities determined through a participatory community needs assessment. CDP budget: minimum 2% of operational net revenue annually. Initial CSI commitment formalised in the CDA.
7	Impacts on groundwater and water sources used by the community	Women's FGD; Town hall	Baseline groundwater quality survey completed — no contamination detected (all parameters within NMDPRA limits per QICLL/AFRIC/01242). No direct pathway for contamination identified; no underground fuel storage. Hydrocarbon containment bunding (110% capacity) installed around all process equipment. Quarterly

			groundwater monitoring at two sentinel boreholes throughout operations.
8	Cultural sites and burial grounds — concern regarding subsurface disturbance	KII (Traditional Ruler)	A Chance Find Procedure (CFP) is incorporated in the ESMP. All ground excavation works supervised by a designated Environmental Inspector. In the event of any cultural finds, work ceases immediately and the Akwa Ibom State History and Culture Bureau (and NCMM) will be notified within 24 hours. Work resumes only after clearance.
9	Grievance handling — how will community members raise complaints?	Town hall (multiple attendees)	Formal Grievance Mechanism presented and explained using illustrated handout in English and Ibibio. Community grievance register established at the community hall. Grievances may be submitted verbally to CLO, in writing (grievance box), or via a dedicated mobile contact number. All grievances acknowledged within 5 working days and resolved within 30 calendar days.

Table ST-3: Summary of Issues Raised During Community Consultation and AfricEnergy Formal Responses and Commitments

Institutional and Regulatory Consultations

Agency	Meeting Date	Key Outcomes / Requirements Identified
NMDPRA — Technical Standards Division	19 February 2026	Confirmed regulatory framework for CNG Mother Station licensing per CNG Code of Practice (2020). Noted requirement for Facility Permit Application to be submitted post-EIA approval. Referenced NMDPRA

		EGASPIN 2nd Edition. No objections to the proposed site or technology configuration.
Akwa Ibom State Ministry of Environment and Mineral Resources (AKSMEMR)	4 March 2026	Confirmed state-level EIA review process and coordination with ASEPA. Noted that no protected areas, critical habitats, or wetlands of state significance are located within 2 km of the project site. Requested AfricEnergy to engage the LGA Community Development Officer before construction.
Uyo Local Government Area — Environment Department	5 March 2026	Confirmed local planning requirements. No known land use conflicts or pending community petitions regarding the proposed site. Requested AfricEnergy to engage the LGA Community Development Officer before construction mobilisation.
Nigerian Gas Marketing Limited (NGML) — Gas Supply Division	10 March 2026	Discussed the Gas Supply and Purchase Agreement (GSPA) framework. NGML confirmed its willingness to issue a Comfort Letter upon satisfactory completion of EIA approval and NMDPRA licensing. No technical objections to the proposed gas offtake volumes of 2.5 MMSCFD.
FMEEnv- Abuja	5th June 2026	EIA registration, confirmed site inspection conducted, EIA document submitted.

Table ST-4: Institutional and Regulatory Consultation Outcomes

Grievance Mechanism — Status at EIA Submission

A project-level Grievance Mechanism (GM) was operationalised from March 2026. The GM is designed to be legitimate and predictable (clear procedures and timelines), accessible (no cost or barrier to access; available in English and Ibibio), rights-compatible (consistent with international human rights standards), and culturally appropriate. Zero unresolved grievances are on record at the time of EIA submission.

Step	Action	Responsibility and Timeline
1	Receipt and Registration	CLO logs grievance in register within 1 working day. Unique reference number assigned.
2	Acknowledgement	Complainant notified (verbally or in writing) within 5 working days of receipt.
3	Assessment and Investigation	CLO and relevant project manager review, investigate root cause, assess response. Within 15 working days.
4	Resolution and Response	Proposed resolution communicated to complainant. If accepted, action implemented and closure confirmed. Target: within 30 calendar days.
5	Escalation (if unresolved)	If complainant unsatisfied, grievance escalated to AfricEnergy Senior Management; mediation may be offered. Complainant retains right to access FMEEnv, NESREA, NMDPRA, or legal remedies.
6	Closure and Documentation	Closure recorded in register. Trend analysis of all grievances reported in quarterly ESMP progress reports.

Table ST-5: Grievance Process and Timeline (Full detail in ESMP Section 15.8)

Information Disclosure

Document	Disclosure Method	Status
Non-Technical Summary (NTS) of EIA	Distributed at community town hall meetings; copies deposited at Uyo LGA office and Ikot Obio Offiong community hall	Completed — March 2026 (bilingual: English/Ibibio)
EIA Scoping Report / Terms of Reference	Submitted to FMEnv/NESREA; available at project offices	Completed — January 2026
Full EIA Report (this document)	Submitted to FMEnv for public hearing; deposited at AKSMEMR and Uyo LGA offices	In progress — June 2026
Environmental and Social Management Plan	Summarised in NTS; full document to be made available at community hall upon request	Available on request from June 2026
ESMS Framework	Available to financial institutions and regulators upon request (Ref: AfricEnergy/CNG/ESMS/2026/001)	Completed — June 2026
Community Development Agreement (CDA)	To be shared with Ikot Obio Offiong community prior to construction commencement	Planned — Q3 2026
Stakeholder Engagement Log	Available to FMEnv, NMDPRA, and lender representatives upon request	Maintained by CLO from March 2026

Table ST-6: Information Disclosure Schedule

A FMEnv-mandated public hearing will be scheduled following submission of this EIA report. The hearing will be advertised in at least two national newspapers and one Akwa Ibom State-based newspaper not less than 21 days in advance, in accordance with FMEnv EIA Procedural Guidelines (2011).

Commitments for Ongoing Stakeholder Engagement

- Pre-construction: finalise and execute the Community Development Agreement (CDA) with Ikot Obio Offiong; establish a Local Employment Register; conduct pre-construction road condition survey; brief community on construction schedule, safety exclusion zones, and emergency assembly point
- Construction Phase: monthly CLO community liaison visits; quarterly community update meetings; real-time grievance register management; workforce Code of Conduct training and community-facing briefings; HIV/STI prevention awareness campaign
- Operational Phase: annual community consultation meetings; annual ESMP audit findings shared with community and regulators; grievance register active throughout operational life; CDP annual impact report published
- Decommissioning Phase: community engagement to commence minimum 24 months before planned decommissioning; Decommissioning and Site Restoration Plan disclosed to community and regulators

CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

This chapter presents the overall conclusions of the Environmental Impact Assessment for the AfricEnergy and Infrastructure Limited 2.5 MMSCFD Compressed Natural Gas (CNG) Mother Station at Ikot Obio Offiong, Akwa Ibom State, Nigeria. It synthesises the findings from Sections 2 through 16 and presents the project team's recommendations regarding environmental and social risk management, regulatory compliance, and conditions for project approval by the Federal Ministry of Environment (FMEnv).

The EIA has been prepared in conformance with: the Environmental Impact Assessment Act (Cap E12 LFN 2004); FMEnv EIA Procedural Guidelines (2011) and EIA Report Writing Format (19-section structure); NMDPRA Environmental Guidelines and Standards (EGASPIN) 2nd Edition; IFC Performance Standards 1–8 (2012 edition) and Equator Principles IV (EP4); and ISO 14001:2015 Environmental Management System principles.

Summary of Project Description

Parameter	Description
Project Title	2.5 MMSCFD CNG Mother Station, Ikot Obio Offiong, Ibesikpo Asutan LGA, Akwa Ibom State
Proponent	AfricEnergy and Infrastructure Limited, 16A Sam Oyovbaire Street, Guzape, FCT, Abuja
Site Location	Ikot Obio Offiong Community, Ibesikpo Asutan LGA, Akwa Ibom State; coordinates ~04°56'42"N, 007°57'03"E (WGS84)
Site Area	~4,000 m ² direct project footprint within ~2.5 ha site boundary (degraded bush fallow scrubland)

Nearest Receptor	~800 m from nearest residential settlement (Ikot Obio Offiong community)
Design Capacity	2.5 MMSCFD Phase 1 (expandable to 5.0 MMSCFD in Phase 2 without additional land acquisition)
Gas Source	Savanna 8-inch lean gas header at ~250 bar; GSPA framework with NGML
CNG Operating Pressure	200–250 bar storage; dispensing at 3,260–3,600 psig (rated to 4,350 psig)
Processing Technology	MRU/JT/Turbo-Expander hybrid; electric-drive reciprocating compressors; silica gel gas drying; Allen-Bradley DCS/SCADA; ESD/F&G PLC
Construction Duration	Approximately 9–18 months for Phase 1
Design Operational Life	25 years
Displacement / Resettlement	None — no households or structures within the project footprint; no involuntary resettlement required
Phase 1 Capital Investment	USD 3.5 million
Document Reference	AfricEnergy/CNG/EIA/2026/001 — June 2026

Table CR-1: Project Summary Parameters

Summary of Baseline Environmental Conditions

Physical Environment

- Air Quality: NMDPRA designation "NO POLLUTION" at all 13 on-site stations (AQ1–AQ13). SPM₁₀ mean 2.31 µg/m³ — 85% below the 2022 EIA baseline of 15.8 µg/m³. No methane, SO₂, BTEX, or VOC contamination detected. All parameters significantly below NMDPRA limits. Prevailing SW wind direction carries any future emissions away from the nearest residential community to the north.
- Groundwater: pH 7.01–7.08; EC 21.80–25.48 µS/cm; DO 6.8–6.9 mg/L; BOD₅ 3.2–4.6 mg/L — all within NMDPRA/FMEnv limits. No heavy metals, TPH, or BTEX above detection limits (Ref: QICLL/AFRIC/01242). Clean groundwater baseline confirmed.
- Soils: No TPH, PAHs, or heavy metal contamination detected. Soil pH 5.2–6.1 (natural leaching). Ultisol/Ferric Luvisol profile typical of Niger Delta coastal plain sands. No pre-existing contamination.
- Noise: Baseline daytime noise at nearest residential receptor (R2, ~800 m): 48 dB(A) — within FMEnv residential limit of 55 dB(A). Night-time: 35 dB(A) — within FMEnv limit of 45 dB(A).
- Hydrology: No perennial rivers, lakes, or protected wetlands within 500 m of the site. Seasonal stream at ~500 m drains into the Qua Iboe River catchment. Groundwater depth: 8–20 m below ground level.

Biological Environment

- Vegetation: Site classified as degraded secondary bush fallow (*Chromolaena odorata* dominant). No A-storey emergent trees within the project footprint. No IFC PS6 Critical Natural Habitats. No IUCN Red List threatened plant species recorded within the 4,000 m² direct footprint. Biodiversity value assessed as Low.
- Fauna: 47 mammalian species, 78 bird species, and 20 reptile species enumerated in the 5 km study area. No IUCN Red List Threatened species within the direct footprint. No IFC PS6 Critical Habitats identified. Biodiversity value of site fauna assessed as Low.

- Ecosystem Services: Limited ecosystem services provided by the bush fallow scrubland. No artisanal farming, fishing, or gathering activities recorded within the project boundary. Freshwater swamp forest ecosystems present in the broader area are outside the direct footprint and will be protected by construction controls.

Socioeconomic Environment

- The host community (Ikot Obio Offiong) has an estimated population of approximately 8,400 persons across three communities. Primary livelihoods: farming (28.6%), informal sector (49%). Median household income NGN 45,000–70,000/month; 37% below ₦88,000/year.
- Access to electricity is intermittent (6–10 hrs/day); community relies predominantly on diesel generators — making clean energy alternatives highly valued.
- Social infrastructure: 17 schools (18,898 pupils), 11 health facilities (32 beds total, 3 doctors), 10 operational private boreholes.
- Community attitude: ~68% support or neutral toward the project. No Indigenous Peoples (IFC PS7) identified. No cultural heritage sites within project footprint per baseline survey.

Conclusions on Environmental and Social Impact Assessment

Overall Impact Finding: No impact has been assessed as residually HIGH or VERY HIGH in significance following the implementation of proposed mitigation measures. All significant negative impacts are reduced to LOW or NEGLIGIBLE with the ESMP measures proposed. The project is assessed as environmentally and socially feasible.

Impact	Phase	Pre-Mitig.	Residual	Key Mitigation Measures
Air quality — construction dust and emissions	Const.	Moderate Significant	Low	Water suppression; speed limits; dust screens; HSSE monitoring

Noise and vibration from construction plant	Const.	Moderate Significant	Low	Daylight hours (07:00–18:00) only; acoustic hoarding; community notification
Surface water and soil contamination	Const.	Moderate Significant	Low–Negligible	Bunded fuel storage; spill kits; oil interceptors; waste management plan
Vegetation clearance and habitat loss	Const.	Low Moderate	Negligible	Limit clearance to 4,000 m ² footprint; no-burn; 3:1 replanting
Traffic and road condition impacts	Const.	Moderate Significant	Low	Axle Load Management Plan; flagmen; pre/post road condition survey
Worker health and safety	Const.	Moderate–High	Low	HSE Plan; mandatory PPE; JSA; toolbox talks; LTI target: zero
Community health, safety, security	Const.	Moderate Significant	Low	Exclusion zone; TMP; disease prevention; Worker Code of Conduct
Socioeconomic — employment (POSITIVE)	Const.+Ops	Positive Significant	Strong Positive	Local Employment Policy (min. 60% local); skills register; CDP

Air quality — compressor exhaust	Ops	Low– Moderate Significant	Low– Negligible	Electric compressors; LDAR quarterly; annual stack monitoring
Fugitive methane / GHG emissions	Ops	Moderate Significant	Low	LDAR monthly OGI; <0.5% fugitive loss; annual GHG inventory (ISO 14064)
Noise from compression operations	Ops	Low Moderate	Negligible	Acoustic enclosures (≥15 dB(A) IL); 800 m buffer; post-commissioning survey
Fire, explosion, gas release risk	Ops	High Significant (inherent)	Low (ALARP)	PSM; HAZOP; SIL-rated ESD/F&G; NFPA-certified design; ERP bi-annually
Groundwater and soil contamination	Ops	Low Moderate	Negligible	Secondary containment (110%); oil-water separator; bi-annual GW monitoring
Socioeconomic — clean energy (POSITIVE)	Ops	High Positive Enhancement	High Positive	CNG displaces diesel; 25% lower CO ₂ /unit energy; 40–60% lower fuel cost
Cumulative GHG contribution	Ops	Low– Moderate	Low	CNG displaces higher-GHG diesel; net lifecycle GHG benefit demonstrated

Table CR-2: Summary of Impact Significance Before and After Mitigation — All Project Phases (Source: EIA Sections 12 and 13)

Conclusions on Alternatives Analysis

- No-Project Alternative: REJECTED. The No-Project scenario forgoes 2.5 MMSCFD of clean energy supply, perpetuates diesel dependency in Akwa Ibom State, eliminates direct employment for 120–180 construction workers and 20–25 permanent staff, and fails to contribute to Nigeria's gas utilisation targets under PIA 2021 and the Presidential CNG Initiative.
- Site Selection: Ikot Obio Offiong is CONFIRMED as the preferred location. Key strengths: proximity to Savanna pipeline (~450 m tie-in route); degraded bush fallow land (no resettlement or agricultural displacement); 800 m buffer to nearest residential receptor; access road availability; expressed community support (68% support/neutral per PERA survey).
- Technology: Electric-drive reciprocating CNG compression at 200–250 bar with Allen-Bradley DCS/SCADA is CONFIRMED as optimal technology — consistent with NMDPRA CNG Code of Practice (2020) and preferred by IFC PS3 for lower Scope 1 emissions. LNG (Alternative D) rejected as economically uncompetitive and operationally complex at this scale.
- Project Scale: 2.5 MMSCFD Phase 1 capacity is CONFIRMED as proportionate to identified market demand and available financing. Phase 2 expansion to 5 MMSCFD planned without additional land acquisition.
- Pipeline Route: Alternative A (Savanna Offtakers, ~450 m) is SELECTED over Alternative B (Other Facility, ~3.5 km) due to minimal environmental footprint, no additional land acquisition, zero resettlement risk, and lower capital cost.

ESMP Management Programmes and Key Performance Indicators

No.	Management Programme	Key Performance Indicator(s)	Reporting Frequency
1	Air Quality and Dust Management	PM ₁₀ at site boundary $\leq 150 \mu\text{g}/\text{m}^3$ (24-hr mean); zero FME _{Env} violation notices; VOC < 500 ppm at fence line	Monthly (construction); Quarterly (operations)
2	Noise Management	Daytime LAeq $\leq 55 \text{ dB(A)}$ at nearest receptor; night LAeq $\leq 45 \text{ dB(A)}$; zero justified noise complaints unresolved	Monthly (construction); Quarterly (operations)
3	Methane and GHG Emissions Management	Fugitive methane $\leq 0.5\%$ of throughput; LDAR completion $\geq 95\%$ annually; Scope 1 < 2,000 tCO ₂ e/year	Quarterly; Annual GHG inventory with 3rd-party verification
4	Waste Management	Zero untreated liquid waste discharge; $\geq 70\%$ solid waste diverted from landfill; 100% hazardous waste to licensed facility	Monthly manifest; Annual waste audit
5	Water Resources and Soil Management	No exceedance of FME _{Env} effluent standards; no groundwater contamination events; OWS discharge O&G < 10 mg/L	Quarterly GW sampling; Post-rain stormwater check
6	Process Safety and Emergency Response	Zero major fire/explosion incidents; ERP tested bi-annually; HAZOP reviewed every 5 years; TRIR < 1.0/200,000 man-hrs	Annual safety audit; incident reporting within 24 hrs

7	Community H&S and Security	Zero LTIs attributable to community security events; grievance closure $\geq 90\%$ within 30 days; zero unresolved odour complaints	Monthly CLO report; Quarterly community meeting
8	Socioeconomic and Community Development	Local employment $\geq 40\%$ unskilled/semi-skilled; CDA executed before construction; CDP spend $\geq 2\%$ net revenue	Semi-annual; Annual CSI reporting
9	Ecology and Biodiversity	Cleared area $\leq 4,000 \text{ m}^2$; 3:1 replanting ratio achieved within 12 months; no new invasive species established	Biannual ecology monitoring
10	GHG and Climate Change	Scope 1 GHG $< 2,000 \text{ tCO}_2\text{e/yr}$; climate resilience infrastructure reviewed every 5 years	Annual GHG inventory; 5-yearly climate review

Table CR-3: ESMP Management Programmes and Key Performance Indicators (Source: ESMP Section 15)

Conclusions on Stakeholder Engagement

- No unresolved objections that would prevent project approval were identified. All nine principal concerns raised by community stakeholders have been formally documented, addressed, and committed to.
- Regulatory agencies (FMEnv, NMDPRA, AKSMEMR, Uyo LGA) raised no technical objections to the project and confirmed their willingness to engage with the permitting and approval process.
- A Grievance Mechanism was operationalised from March 2026. Zero unresolved grievances are on record at the time of EIA submission.

- A Community Development Agreement (CDA) will be executed with Ikot Obio Offiong community before construction commences, formalising CSI commitments (minimum 2% net revenue annually), employment policy (minimum 60% local), and road rehabilitation obligations.
- The FMEnv-mandated public hearing will be advertised in at least two national newspapers and one Akwa Ibom State newspaper not less than 21 days in advance and conducted following submission of this EIA. AfricEnergy is committed to incorporating public hearing outcomes into the final EIA response documentation.

Recommendations for Project Approval

AfricEnergy and Infrastructure Limited respectfully recommends that the Federal Ministry of Environment (FMEnv) grant Environmental Compliance Certificate (ECC) approval for the 2.5 MMSCFD CNG Mother Station at Ikot Obio Offiong, Akwa Ibom State, subject to the following conditions:

1. Full implementation of the Environmental and Social Management Plan (ESMP) as set out in Section 15 of this report, with the ESMP forming a binding component of the ECC
2. Submission of a Pre-Construction Compliance Report to FMEnv at least 30 days prior to construction mobilisation, confirming: (a) execution of the Community Development Agreement; (b) establishment of the Grievance Mechanism register at community hall; (c) pre-construction road condition survey completion and documentation; (d) NOSDRA Oil Spill Contingency Plan registration; and (e) appointment of a certified Environmental Compliance Officer and Community Liaison Officer
3. Completion and submission of a certified HAZOP study to NMDPRA prior to commissioning, with findings incorporated into the final Process Safety Management (PSM) Plan
4. Semi-annual ESMP progress reports to FMEnv for the first three years of operations, transitioning to annual thereafter subject to demonstrated compliance

5. Annual independent Environmental and Social Audit by an FMEnv-certified independent auditor, commencing one year after operational commencement; audit reports shared with FMEnv, NMDPRA, financiers, and the Ikot Obio Offiong community liaison

Pre-Construction Recommendations

- Execute the Community Development Agreement (CDA) with Ikot Obio Offiong community incorporating CSI commitments, local employment policy, and road rehabilitation obligations before construction mobilisation
- Conduct pre-construction road condition survey; document baseline condition in photographic and engineering record shared with Uyo LGA Authority; repair all attributable damage within 30 days of construction completion
- Register the project Oil Spill Contingency Plan with NOSDRA prior to commencement of any earthworks or construction activities
- Publicly communicate the Grievance Mechanism through posted notices at site gate, Ikot Obio Offiong Community Hall, and Uyo LGA office; ensure CLO is reachable by phone for grievance receipt
- Develop and circulate a Construction Phase HSSE Plan to all contractors at pre-commencement induction; include the Chance Find Procedure as a mandatory training module

Operational Recommendations

- Implement LDAR programme (EPA Method 21/OGI) from Day 1 of operations; annual third-party GHG inventory verification every 3 years; LDAR programme results disclosed to FMEnv quarterly
- Install continuous ambient air quality and perimeter noise monitoring systems; data accessible to CLO and transmitted to FMEnv quarterly

- Commission a post-construction fauna and vegetation survey within 12 months of construction completion to verify no unintended biodiversity impacts beyond the approved 4,000 m² footprint
- Develop a Climate Resilience and Adaptation Plan incorporating projected Akwa Ibom State climate trends; incorporate findings into facility design and maintenance schedules; review at 5-year intervals
- Conduct annual full-scale emergency simulation exercise involving community emergency response volunteers; review and update ERP within 30 days of each drill

Future Development Recommendations

- Before any Phase 2 capacity expansion (to 5 MMSCFD), prepare an EIA Addendum or new Full EIA as directed by FMEnv to assess incremental impacts from additional compressor units, storage capacity, and increased vehicle movements
- Explore solar-assisted power supply to reduce reliance on diesel generators for auxiliary power, consistent with AfricEnergy's ESG commitments and Nigeria's Renewable Energy Action Plan
- Consider participation in Nigeria's gas flare capture programme through NUPRC/NMDPRA to integrate flare gas as supplementary CNG feedstock, subject to additional environmental assessment

Regulatory Compliance Status Matrix

Regulatory Requirement	Applicable Instrument	Status	Responsible Party
Full EIA preparation and FMEnv submission	EIA Act Cap E12 LFN 2004; FMEnv EIA Report Writing Format	Completed — June 2026	AfricEnergy

FMEEnv EIA Public Hearing	FMEEnv EIA Procedural Guidelines 2011	Pending — post submission	FMEEnv / AfricEnergy
Environmental Compliance Certificate (ECC)	EIA Act / FMEEnv	Pending — post public hearing and FMEEnv review	FMEEnv → AfricEnergy
NMDPRA Facility Construction and Operating Permit	NMDPRA CNG Code of Practice 2020; EGASPIN 2nd Ed.	To be submitted post-EIA approval	AfricEnergy
NOSDRA Oil Spill Contingency Plan Registration	NOSDRA Act 2006	To be registered prior to construction commencement	AfricEnergy
Akwa Ibom State Environmental Permit (ASEPA)	AKSMEMR / ASEPA Law	Parallel submission in progress — March 2026	AfricEnergy / AKSMEMR
Gas Supply and Purchase Agreement (GSPA)	NGML / NMDPRA	In negotiation; NGML Comfort Letter requested	AfricEnergy / NGML
Process Safety Management (PSM) Plan	NMDPRA Safety Regulations	To be completed prior to commissioning	AfricEnergy

HAZOP Study — NMDPRA submission	NMDPRA / IFC EHS Guidelines	Planned for FEED stage; independent HAZOP team	AfricEnergy + Specialist Team
Fire Safety Certificate	NFSC / Akwa Ibom State Fire Service	Obtained	AfricEnergy
Community Development Agreement (CDA)	IFC PS1; AfricEnergy ESMS commitment	To be executed prior to construction — Q3 2026	AfricEnergy / Ikot Obio Offiong Community
Certificate of Occupancy (C-of-O)	Land Use Act CAP L5 LFN 2004	C-of-O process initiated with Akwa Ibom State Lands Commission	AfricEnergy

Table CR-4: Regulatory Compliance Status Matrix

Overall Conclusion

This Environmental Impact Assessment has rigorously assessed the potential environmental, social, health, and safety impacts of the proposed 2.5 MMSCFD Compressed Natural Gas (CNG) Mother Station at Ikot Obio Offiong, Akwa Ibom State. The assessment was structured in accordance with **Environmental & Social Impact Assessment (ESIA) for the Phase III of the Energizing Education Programme (2022)** conducted by **Federal Ministry of Environment (2022) for Savanna Pipeline** and the Environmental Data collected from the proposed 2.5mmsfcd CNG plant on 29th – 30th April 2026 by Quaternary International Company Limited, and the five-step impact assessment methodology.

- The project is technically feasible, commercially viable, and fully consistent with Nigeria's national energy policy under the PIA 2021, the National Gas Expansion Programme, the Presidential CNG Initiative (2023), and Nigeria's Nationally Determined Contribution (NDC) commitments under the Paris Agreement.
- No significant unmitigable adverse environmental or social impact has been identified. All assessed impacts are reduced to Low or Negligible residual significance through the engineering controls and ESMP management measures documented in Sections 14–15.
- The project site at Ikot Obio Offiong is environmentally suitable: degraded secondary bush fallow (*Chromolaena odorata* dominant) with no IFC PS6 Critical Habitats, no IUCN threatened species within the 4,000 m² footprint, no residential structures, no involuntary resettlement requirement, and an 800 m buffer to the nearest residential receptor.
- Baseline environmental conditions are excellent: NMDPRA designation "NO POLLUTION" at all 13 air quality stations; no groundwater contamination detected; no soil hydrocarbon contamination confirmed.
- The project delivers significant net positive socioeconomic outcomes: minimum 60% local employment; estimated NGN 18–25 million/year in direct community wages; 2.5 MMSCFD of CNG displacing diesel and reducing CO₂ by approximately 25% per unit of energy; and a CDP funded at minimum 2% of net revenue annually.
- The stakeholder engagement process was inclusive, transparent, and responsive. Community members expressed conditional support for the project with all nine principal concerns formally documented and committed to. A Grievance Mechanism is operational with zero unresolved grievances at EIA submission.
- The Environmental and Social Management Plan provides a credible, measurable, and enforceable framework for managing all identified impacts, with clear responsibilities, KPIs, and reporting mechanisms aligned with FMEEnv conditions of approval and IFC PS1.

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APPENDICES

Appendix A: Laboratory Certificate of Analysis — Groundwater Samples (GW1, GW2, GW3, GWC1)

Quatenary International Company Limited, Port Harcourt. Reference: QICLL/AFRIC/01242. Client: Afric Energy Ltd. Project: Preliminary Environmental Risk Assessment (PERA). Location: Ibesikpo Asutan, Akwa Ibom State. Date Sampled: 29/04/2026. Date Received: 29/01/2026. Date of Analysis: 18/05/2026. Sample Matrix: Water. Analyst: Nancy Ikpire. Approved by: Gabrieline Joseph-Legend (Lab Manager). Principal Scientist: Prof. Joseph Legend Mfon (Professor of Environmental Management). NMDPRA-approved; NAFDAC-accredited; ISO 17025-compliant.



QUATERNARY INTERNATIONAL CO. LIMITED

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BRANCH OFFICE: PLOT 1, 38TH STREET, CUSTOM BARRIAGE ROAD, UGBOHOKO EFURUN DELTA STATE E-MAIL: info@quaternaryid.com

OUR REF: QICLL/AFRIC/01242

DATE: 18/05/2026

CERTIFICATE OF ANALYSIS

NAME OF CLIENT	AFRIC ENERGY LTD.	DATE SAMPLED	29/04/2026
ADDRESS OF CLIENT	IBESIKPO ASUTAN, AKWA IBOM STATE	DATE RECEIVED	29/01/2026
PROJECT TITLE	PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA)	SAMPLE MATRIX	WATER

TEST	UNIT	NUPRC LIMIT	AF GW 1	AF GW 2	AF GW 3	AF GWC
pH	--	6.5 – 8.5	7.02	7.08	7.01	6.94
Electrical Conductivity	(µS/cm)	NA	25.48	21.80	22.72	26.15
Total Dissolved Solid	mg/l	200 – 500	15.28	13.0	13.6	15.69
Temperature	°C	25	27.4	27.2	27.4	26.8
Salinity	ppt	NA	0.01	0.01	0.01	0.01
Dissolved Oxygen	mg/l	NA	6.90	6.90	6.9	6.8
Turbidity	NTU	25	0.0	0.28	0.32	0.32
Total Suspended Solid	mg/l	NA	0.0016	0.0001	0.0002	0.0011
COD	mg/l	NA	3.760	7.52	7.50	3.70
BOD	mg/l	NA	3.600	3.200	4.600	3.100
Sulphate	mg/l	<250	0.141	<0.001	<0.001	<0.001
Alkalinity	mg/l	NA	1.00	1.00	2.00	3.00
Nitrate	mg/l	50	0.072	0.061	0.162	0.051
Nitrite	mg/l	NA	0.028	0.030	0.011	0.013
Phosphate	mg/l	NA	2.000	4.000	3.000	1.000
Reactive silica	mg/l	NA	0.303	0.250	0.230	0.011
Ammonium	mg/l	NA	<0.001	<0.001	<0.001	<0.001
Potassium	mg/l	NA	0.049	0.039	0.138	0.049
Sodium	mg/l	NA	0.066	0.056	0.018	0.196
Magnesium	mg/l	NA	0.218	0.066	0.141	0.085
Calcium	mg/l	NA	0.184	0.227	0.151	0.284
Manganese	mg/l	NA	0.199	0.142	0.051	0.284
THB	(cfu/ml) x10 ³	NA	2.0	2.1	1.0	1.1
THF	(cfu/ml) x10 ³	NA	2.5	2.2	1.2	1.0
THUB	(cfu/ml) x10 ³	NA	0.5	0.7	0.2	0.4
THUF	(cfu/ml) x10 ³	NA	0.7	0.9	0.3	0.1
Total Coliform	(cfu/ml) x10 ³	NA	2	3	0	0
Oil & Grease	mg/l	0.5	0.263	0.242	<0.001	<0.001
TPH	mg/l	5000	<0.001	<0.001	<0.001	<0.001
BTEX	mg/l	10	<0.001	<0.001	<0.001	<0.001
Copper	mg/l	0.035	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/l	0.006	<0.001	<0.001	<0.001	<0.001
Lead	mg/l	0.075	<0.001	<0.001	<0.001	<0.001
Iron	mg/l	0.1	0.012	0.033	0.039	0.037
Zinc	mg/l	0.8	0.253	0.286	0.405	0.378
Chromium	mg/l	0.03	<0.001	<0.001	<0.001	<0.001
Vanadium	mg/l	NA	<0.001	<0.001	<0.001	<0.001
Barium	mg/l	0.625	<0.001	<0.001	<0.001	<0.001
Mercury	mg/l	0.0003	<0.001	<0.001	<0.001	<0.001
Nickel	mg/l	0.075	<0.001	<0.001	<0.001	<0.001

I HEREBY CERTIFY THAT WE HAVE ANALYSED THE ABOVE SAMPLE AS RECEIVED FROM OUR CLIENT, AND HEREBY PRESENT OUR FINDINGS.

NAME OF ANALYST: 
SIGNATURE: NANCY IKPIRE



APPROVED BY: 
GABRIELINE JOSEPH-LEGEND
(LAB MANAGER)

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Appendix A: Certificate of Analysis — Groundwater Samples GW1, GW2, GW3, and Control GWC (QICLL/AFRIC/01242, 18 May 2026). All parameters within NMDPRA limits. No heavy metals, TPH, or BTEX detected above detection limits — clean groundwater baseline confirmed.

Appendix B: Laboratory Certificate of Analysis — Soil Samples (SS Series)

Same laboratory reference: QICLL/AFRIC/01242. Sample Matrix: Soil A (0–15 cm depth) and Soil B (15–30 cm depth). Samples SS1A through SS10B collected at 6 locations across the site footprint and buffer zone using hand augering to 1.5 m depth. Analysis: pH, EC, texture, organic carbon, bulk density, porosity, total nitrogen, total phosphorus, available phosphorus, exchangeable cations (K, Na, Mg, Ca), CEC, microbiological parameters (THB, THF, THUB, THUF), heavy metals (Cu, Cd, Pb, Fe, Zn, Cr, V, Ba, Hg, As, Ni), TPH, BTEX, and PAHs.



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OUR REF: QICLL/AFRIC/01242

DATE: 18/05/2026

CERTIFICATE OF ANALYSIS

NAME OF CLIENT	AFRIC ENERGY LTD.	DATE SAMPLED	29/04/2026
ADDRESS OF CLIENT	IBESIKPO ASUTAN, AKWA IBOM STATE	DATE RECEIVED	20/01/2026
PROJECT TITLE	PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA)	SAMPLE MATRIX	SOIL: A=(0-15cm) B=(15-30cm)

TEST	UNIT	NUPRC LIMIT	AF SS1A	AF SS1B	AF SS2A	AF SS2B	AF SS3A	AF SS3B	AF SS4A	AF SS4B	AF SS5A	AF SS5B
PH	—	NA	4.015	4.130	4.220	4.335	4.500	4.680	4.050	4.165	4.405	4.535
color	—	NA	reddish black brown	reddish black brown	grayish brown	gray	reddish black brown	reddish black brown	reddish black brown	reddish brown	dark reddish gray	dark reddish gray
EC	(µS/cm)	NA	96,500	98,500	93,000	94,500	96,000	95,000	76,000	82,500	92,500	88,500
Sand	Particle Size	NA	95,000	88,000	93,000	95,000	95,000	93,000	94,000	91,000	95,000	95,000
Silt		NA	4,000	4,000	5,000	3,000	3,000	5,000	5,000	5,000	4,000	4,000
Clay		NA	1,000	3,000	2,000	2,000	2,000	2,000	1,000	4,000	1,000	1,000
Texture	—	NA	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND
Bulk Density	g/cm	NA	1.235	1.415	1.237	1.463	1.338	1.485	1.255	1.393	1.467	1.540
Porosity	%	NA	53.556	46.786	53.500	45.000	49.691	44.162	52.822	47.648	44.834	42.098
Permeability	g/cm	NA	1.500	1.600	1.600	1.600	1.700	1.500	1.500	1.600	1.500	1.600
Erosion potential	Na/Hr/Yr	NA	30	28	30	27	29	26	30	28	25	25
%Carbonate	%	mg/kg	1.502	1.580	1.872	1.931	1.833	1.911	1.775	2.087	1.970	1.892
Total Nitrogen	%	mg/kg	0.12	0.14	0.09	0.10	0.08	0.11	0.07	0.09	0.10	0.12
Av. Phosphorus	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate	mg/kg	NA	40.612	33.469	31.837	42.296	41.684	42.551	42.296	42.908	41.888	43.214
Nitrite	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
CEC	meq/100g	NA	0.947	0.588	0.930	0.497	0.886	0.490	0.840	0.403	0.894	0.922
Ammonium	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	meq/100g	NA	0.140	0.145	0.131	0.084	0.092	0.072	0.082	0.061	0.069	0.071
Sodium	meq/100g	NA	0.589	0.213	0.592	0.199	0.586	0.202	0.591	0.166	0.591	0.604
Magnesium	meq/100g	NA	0.112	0.116	0.106	0.107	0.103	0.105	0.083	0.085	0.094	0.096
Calcium	meq/100g	NA	0.106	0.114	0.101	0.106	0.105	0.111	0.084	0.090	0.139	0.152
THC	mg/kg	500	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH	mg/kg	5000	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BTEX	mg/kg	206	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PAH	mg/kg	40	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/kg	190	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/kg	120	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/kg	530	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/kg	720	0.197	0.469	0.203	0.183	0.218	0.222	0.218	0.305	0.353	0.318
Iron	mg/kg	NA	46.995	37.470	38.631	36.518	41.905	40.714	39.196	39.673	41.339	36.190
Vanadium	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/kg	380	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nikel	mg/kg	210	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/kg	55	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/kg	625	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/kg	0.3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
THB	(cfu/g) x10 ³	NA	1.3	0.6	1.0	1.0	1.0	1.3	1.2	1.3	1.1	1.2
THF	(cfu/g) x10 ³	NA	1.2	1.0	0.7	0.4	0.2	0.4	1.4	1.3	0.7	1.2
HUB	(cfu/g) x10 ³	NA	0.6	0.7	0.7	0.2	0.3	0.8	0.2	0.6	0.3	0.6
HUF	(cfu/g) x10 ³	NA	0.3	0.1	0.3	0.1	0.0	0.0	0.4	0.3	0.4	0.6

I HEREBY CERTIFY THAT WE HAVE ANALYSED THE ABOVE SAMPLE AS RECEIVED FROM OUR CLIENT, AND HEREBY PRESENT OUR FINDINGS

NAME OF ANALYST: 
SIGNATURE: NANCY IKPIRE



APPROVED BY: 
GABRIELINE JOSEPH-LEGEND
(LAB MANAGER)

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Appendix B.1: Certificate of Analysis — Soil Samples SS1A–SS5B (Sample Matrix: Soil A [0–15 cm] and Soil B [15–30 cm];

Ref: QICLL/AFRIC/01242; Date: 18/05/2026)



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CONT....

TEST	UNIT	NUPRC LIMIT	AF SS6A	AF SS6B	AF SS7A	AF SS7B	AF SS8A	AF SS8B	AF SS9A	AF SS9B	AF SS10A	AF 10B
PH	—	NA	4.035	4.145	4.510	5.100	3.840	4.030	4.130	3.850	4.200	3.850
color	—	NA	dark reddish brown	dark reddish brown	brown	brown	reddish black brown	dark reddish brown	grayish brown	brown	brown	brown
EC	(μ S/cm)	NA	86.500	84.500	73.500	76.000	90.000	95.000	65.500	66.500	62.500	68.000
Sand	Particle Size	NA	93.000	93.000	94.000	92.000	94.000	93.000	94.000	93.000	94.000	93.000
Silt	NA	NA	5.000	6.000	5.000	6.000	5.000	5.000	5.000	6.000	5.000	5.000
Clay	NA	NA	2.000	1.000	1.000	2.000	1.000	2.000	1.000	1.000	1.000	2.000
Texture	—	NA	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND
Bulk Density	g/cm	NA	1.392	1.508	1.349	1.493	1.266	1.468	1.509	1.459	1.513	1.261
Porosity	%	NA	47.652	43.305	49.291	43.877	52.418	44.898	43.271	45.168	43.117	52.610
Permeability	g/cm	NA	1.500	1.700	1.700	1.500	1.500	1.600	1.600	1.600	1.600	1.600
Erosion potential	Ha/Hr/Yr	NA	26	25	29	25	31	25	25	26	25	30
% Carbonate	%	mg/kg	1.853	2.009	1.716	1.814	1.794	1.853	2.048	1.872	1.970	1.931
Total Nitrogen	%	mg/kg	0.11	0.04	0.10	0.13	0.09	0.11	0.12	0.16	0.12	0.15
Av. Phosphorus	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate	mg/kg	NA	42.194	43.316	42.398	43.878	43.010	44.337	43.418	41.531	43.214	42.194
Nitrite	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
CEC	meq/100g	NA	0.865	0.436	0.924	0.936	0.895	0.943	0.832	0.426	0.849	0.859
Ammonium	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	meq/100g	NA	0.066	0.072	0.079	0.062	0.042	0.064	0.039	0.054	0.057	0.061
Sodium	meq/100g	NA	0.606	0.199	0.608	0.626	0.620	0.636	0.607	0.174	0.593	0.607
Magnesium	meq/100g	NA	0.095	0.060	0.098	0.103	0.102	0.105	0.109	0.111	0.093	0.094
Calcium	meq/100g	NA	0.097	0.105	0.139	0.145	0.130	0.138	0.078	0.086	0.105	0.097
THC	mg/kg	500	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH	mg/kg	5000	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BTEX	mg/kg	206	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PAH	mg/kg	40	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/kg	190	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/kg	120	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/kg	530	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/kg	720	0.185	0.224	0.214	0.594	0.220	0.289	0.245	0.230	0.399	0.243
Iron	mg/kg	NA	37.083	44.018	39.196	39.673	37.827	41.458	40.685	39.345	38.780	42.827
Vanadium	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/kg	380	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/kg	210	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/kg	55	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/kg	625	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/kg	0.3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
THS	(cfu/g) $\times 10^1$	NA	1.8	1.2	1.0	0.9	1.2	1.5	1.5	1.1	1.3	1.5
THF	(cfu/g) $\times 10^1$	NA	1.4	1.1	0.4	0.2	1.5	1.2	1.7	1.1	1.0	1.2
HUB	(cfu/g) $\times 10^1$	NA	0.4	0.5	0.5	0.6	0.1	0.7	0.8	0.3	0.7	0.7
HUF	(cfu/g) $\times 10^1$	NA	0.1	0.7	0.0	0.0	0.2	0.7	0.1	0.6	0.3	0.3

I HEREBY CERTIFY THAT WE HAVE ANALYSED THE ABOVE SAMPLE AS RECEIVED FROM OUR CLIENT, AND HEREBY PRESENT OUR FINDINGS

NAME OF ANALYST: 
SIGNATURE: NANCY IKPIRE



APPROVED BY: 
GABRIELINE JOSEPH-LEGEND
(LAB MANAGER)

00120 |

Appendix B.2: Certificate of Analysis — Soil Samples SS6A–SS10B (Continuation; Ref: QICLL/AFRIC/01242)



QUATERNARY INTERNATIONAL CO. LIMITED

HEAD OFFICE: PLOT 516, 1ST STREET, DOPA ESTATE, UGBORWONO ETERUN DELTA STATE TEL: 0903064881, 0903067150, E-MAIL: info@quaternarycl.com
BRANCH OFFICE: PLOT 3, 1ST STREET, CUSTON HARBOUR ROAD, UGBORWONO ETERUN DELTA STATE E-MAIL: info@quaternary@yahoo.com

CONT....

TEST	UNIT	NUPRC LIMIT	AF SS11A	AF SS11B	AF SS12A	AF SS12B	AF SS13A	AF SS13B	AF SSC1A	AF SSC1B	AF SSC2A	AF SSC2B
PH	--	NA	4.000	3.850	4.340	4.070	3.990	4.000	4.380	4.320	4.235	3.800
color	--	NA	brown	brown	brown	brown	brown	brown	brown	brown	brown	brown
EC	(uS/cm)	NA	97.500	93.000	78.000	75.000	79.000	87.500	91.500	97.500	127.500	132.500
Sand	NA	NA	93.000	94.000	93.000	94.000	92.000	93.000	95.000	96.000	94.000	93.000
Silt	NA	NA	5.000	5.000	5.000	5.000	6.000	5.000	4.000	3.000	4.000	5.000
Clay	NA	NA	2.000	1.000	2.000	1.000	2.000	2.000	1.000	1.000	2.000	2.000
Texture	--	NA	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND	SAND
Bulk Density	g/cm	NA	1.391	1.267	1.269	1.350	1.440	1.309	1.470	1.240	1.422	1.372
Porosity	%	NA	47.715	52.366	52.304	49.243	45.878	50.776	44.730	53.395	46.525	48.423
Permeability	g/cm	NA	1.709	1.509	1.500	1.600	1.600	1.500	1.700	1.700	1.500	1.500
Erosion potential	Ha/Hr/Yr	NA	29	32	32	30	26	30	26	32	26	28
%Carbonate	%	mg/kg	1.794	1.853	1.619	1.560	1.482	1.404	1.911	2.009	1.970	1.931
Total Nitrogen	%	mg/kg	0.12	0.14	0.08	0.12	0.19	0.14	0.11	0.16	0.12	0.14
Av. Phosphorus	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate	mg/kg	NA	43.316	42.398	43.878	43.010	44.337	43.618	41.531	43.337	43.418	42.531
Nitrite	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
CEC	meq/100g	NA	0.392	0.804	0.760	0.796	0.885	0.931	0.964	0.881	0.572	0.887
Ammonium	%	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Potassium	meq/100g	NA	0.041	0.047	0.042	0.049	0.139	0.159	0.167	0.060	0.044	0.032
Sodium	meq/100g	NA	0.193	0.586	0.562	0.578	0.588	0.598	0.602	0.616	0.271	0.595
Magnesium	meq/100g	NA	0.080	0.084	0.073	0.076	0.082	0.085	0.106	0.110	0.105	0.108
Calcium	meq/100g	NA	0.078	0.087	0.083	0.093	0.075	0.089	0.089	0.095	0.152	0.153
THC	mg/kg	500	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH	mg/kg	5000	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BTEX	mg/kg	206	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PAH	mg/kg	40	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/kg	190	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/kg	120	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/kg	530	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/kg	720	0.324	0.222	0.237	0.262	0.189	0.230	0.805	0.378	0.438	0.235
Iron	mg/kg	NA	41.637	40.089	37.500	36.896	40.833	37.381	45.149	39.554	39.851	44.821
Vanadium	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/kg	380	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nikel	mg/kg	210	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/kg	55	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/kg	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/kg	625	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/kg	0.3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
THB	(cfu/g) x10 ⁵	NA	1.3	1.1	1.6	1.2	1.3	1.2	1.2	1.4	1.2	0.8
THF	(cfu/g) x10 ⁵	NA	1.6	1.3	0.9	1.2	0.9	1.2	1.0	1.3	1.3	0.9
HUB	(cfu/g) x10 ⁵	NA	0.6	0.9	0.5	0.2	0.4	1.0	0.7	0.5	0.6	0.7
HUF	(cfu/g) x10 ⁵	NA	0.7	0.6	0.0	0.1	0.5	0.4	0.7	0.6	0.3	0.8

I HEREBY CERTIFY THAT WE HAVE ANALYSED THE ABOVE SAMPLE AS RECEIVED FROM OUR CLIENT, AND HEREBY PRESENT OUR FINDINGS.

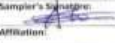
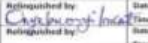
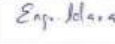
NAME OF ANALYST: 
SIGNATURE: NANCY IKPIRE



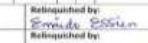
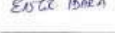
APPROVED BY: 
GABRIELINE JOSEPH-LEGEND
(LAB MANAGER)

00121 |

Appendix B.3: Certificate of Analysis — Additional Soil Parameters including PAHs, Microbiology, and Trace Metals (Ref: QICLL/AFRIC/01242)

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD										
QUATERNARY INTERNATIONAL COMPANY LIMITED										
PLOT 576, 14 TH STREET, DDPA ESTATE, 14, BORIKOKO, EFFERIN, DELTA STATE										
PROJECT NO:		PROJECT NAME: PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA)				PROJECT LOCATION: IBESIKPO ASUTAN, AKWA IBOM STATE				
Field Sample No./ Identification	Date/ Time	Grab/ Composite	Sample Container (Size/ Maker)	Sample Type (Surface Water, Soil, Sediment, etc.)	Preservation	Analysis Requested		Lab. Remark	Lab. Log Number	
AF-GW1 AF-GW2 AF-GW3 AF-GW4	29-04-2026		1.16L Plastic Can, Glass Bottle, 100ml Plastic Can, Amber Bottle	Ground Water	Sulphuric Acid, Nitric Acid, Ice Chest/ Cooler, Ice gel/ iced block	PHYSICO-CHEMICAL: Colour, Alkalinity, BTEX, TPH, TSS, Oil and Grease BOD ₅ , COD, Anions /Cations: NH ₄ ⁺ , NO ₃ ⁻ , NO ₂ ⁻ , PO ₄ ³⁻ , SO ₄ ²⁻ , SiO ₂ ⁻ , Na ⁺ , K ⁺ , Ca ²⁺ , Mn ²⁺ , Mg ²⁺ Heavy Metals: (Fe, Cd, Cr, Ni, V, Pb, Zn, Ba, Hg), etc. MICROBIOLOGY: THB, THF, THUB, THUF, Total coliforms.				
Sampler's Signature: 		Relinquished by: 		Date: 29/04/26	Relinquished by: 		Date: 29-04-26	Received by: 		Date: 29-4-26
Affiliation:		Relinquished by:		Date:	Relinquished by:		Date:	Received by:		Date:
Sampler's Remark:		Received for Laboratory by (Sign): Quaternary International Company Limited								
Samples were collected and preserved in accordance with EGASPIN 2018		Data Results to:								
AFRIC ENERGY REP'S Name, Date & Sign:		QUATERNARY INT'L REP'S Name, Date & Sign:								
Eng. Ndolu Nkhu 29/04/2026 		Emmanuel Eson 29/04/2026 								

Appendix C.1: Analysis Request and Chain of Custody Record — Groundwater Samples AF-GW1 through AF-GW4 (Ground Water; Field Date: 29/04/2026; Sample Container: 1 L Plastic Can/Glass Bottle/Plastic Can; Preservation: Ice Chest/Cool Block; EGASPIN 2018 compliant)

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD										
QUATERNARY INTERNATIONAL COMPANY LIMITED										
PLOT 12 ODANG GREEN CITY, ELELEWON, PORT HARCOURT, RIVERS STATE										
PROJECT NO:		PROJECT NAME: PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA)				PROJECT LOCATION: IBESIKPO ASUTAN, AKWA IBOM STATE				
Field Sample No./ Identification	Date/ Time	Grab/ Composite	Sample Container (Size/ Maker)	Sample Type (Surface Water, Soil, Sediment, etc.)	Preservation	Analysis Requested		Lab. Remark	Lab. Log Number	
AF-SS1 (0-10cm, 15-20cm) AF-SS2 (0-15cm, 15-20cm) AF-SS3 (0-15cm, 15-20cm) AF-SS4 (0-15cm, 15-20cm) AF-SS5 (0-15cm, 15-20cm) AF-SS6 (0-15cm, 15-20cm) AF-SS7 (0-15cm, 15-20cm) AF-SS8 (0-15cm, 15-20cm) AF-SS9 (0-15cm, 15-20cm) AF-SS10 (0-15cm, 15-20cm) AF-SS11 (0-15cm, 15-20cm) AF-SS12 (0-15cm, 15-20cm) AF-SS13 (0-15cm, 15-20cm) AF-SS14 (0-15cm, 15-20cm) AF-SS15 (0-15cm, 15-20cm)	29-04-2026		Aluminum Foil, Polyethylene Bag	Soil Sample	Aluminum Foil, Polyethylene Bag, Ice Chest/ Cooler, Ice gel/ iced block	PHYSICO-CHEMICAL: pH, TPH, PAH, BTEX, Phenols, Percent Carbon, Cation exchange capacity (CEC), Conductivity, Oil and grease, texture, grain size analysis, porosity, permeability, bulk density, erosion potential, Available PO₄³⁻, Total-N, NH₄⁺, NO₃⁻, NO₂⁻, Na⁺, K⁺, Ca²⁺, Mg²⁺. Heavy Metals: Fe, Cd, Cr, Pb, Cu, Hg, Ar, Ni, V, Zn, Ba, As. MICROBIOLOGY: THB, THF, THUB, THUF.				
Sampler's Signature: 		Relinquished by: 		Date: 29-04-26	Relinquished by: 		Date: 29-04-26	Received by: 		Date: 29-4-26
Affiliation:		Relinquished by:		Date:	Relinquished by:		Date:	Received by:		Date:
Sampler's Remark:		Received for Laboratory by (Sign): Quaternary International Company Limited								
Samples were collected and preserved in accordance with EGASPIN 2018		Data Results to:								
AFRIC ENERGY REP'S Name, Date & Sign:		QUATERNARY INT'L REP'S Name, Date & Sign:								
Eng. Ndolu Nkhu 29/04/2026 		Emmanuel Eson 29/04/2026 								

Appendix C.2: Analysis Request and Chain of Custody Record — Soil Samples AF-SS1 through AF-SS12 (Sample Type: Soil; Container: Aluminium Foil/Polyethylene Bag; Preservation: Ice Chest/Cool Block; Field Date: 29/04/2026; EGASPIN 2018 compliant)

**AIR QUALITY RESULT FOR THE PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA) OF THE
PROPOSED 2.5MMSCFD COMPRESSED NATURAL GAS (CNG) MOTHER STATION, IKOT OBIO OFFONG,
IBESIKPO ASUTAN L.G.A, AKWA IBOM STATE**

DATE: 29-04-2026

PARAMETERS	NMDPRA LIMIT	AF AG1	AF AG2	AF AG3	AF AG4	AF AG5	AF AG6	AF AG7	AF AG8	AF AG9	AF AG10	AF AG11	AF AG12
VOC ($\mu\text{g}/\text{m}^3$)	160	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.0	0.2	0.1	0.5
NO _x ($\mu\text{g}/\text{m}^3$)	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SO _x ($\mu\text{g}/\text{m}^3$)	125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO ($\mu\text{g}/\text{m}^3$)	20	0.2	0.2	0.2	0.1	0.2	0.5	0.4	1.0	1.1	0.8	0.5	1.0
CO ₂ (ppm)		485.0	478.0	476.0	480.0	485.0	488.0	480.0	475.0	485.0	480.0	480.0	490.0
CH ₄ ($\mu\text{g}/\text{m}^3$)	NA	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Temperature (°C)	25	28.6	28.2	28.9	28.6	28.4	28.1	28.8	28.5	28.6	28.7	28.4	
Relative Humidity (%)	NA	82.0	79.8	78.1	78.4	79.4	75.2	72.6	69.1	68.5	67.4	64.5	68.0
Wind Speed (m/s)	NA	2.0	1.2	1.8	1.1	1.4	1.4	0.6	0.9	1.2	1.6	1.2	0.8
Wind Direction	NA	SW	SW	SW	SW	SW	SW	SW	SW	SE	SW	SW	
SPM ₁₀ ($\mu\text{g}/\text{m}^3$)	250	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
SPM _{2.5} ($\mu\text{g}/\text{m}^3$)	250	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
SPM _{10-2.5} ($\mu\text{g}/\text{m}^3$)	250	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	1.00	2.00	1.00
Noise Level dB(A)	85	48.2	45.3	46.2	44.9	42.2	44.3	43.6	44.6	46.2	46.8	45.2	44.7
Time		9:58am	10:04am	10:20am	10:34am	10:43am	10:57am	11:15am	11:26am	11:40am	11:58am	12:12pm	12:19pm

AFRIC ENERGY REP'S

 Engr. Idara Sylvester Umoguzang
 DATE & SIGN 29/04/2026

QUATERNARY INT'L REP'S

 Emmanuel Johnson
 DATE & SIGN 29/04/2026

Appendix C.3: Chain of Custody Record — Additional Sample Batch (Field sampling 30 April 2026; Quaternary International Company Limited)

**AIR QUALITY RESULT FOR THE PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT (PERA) OF THE
PROPOSED 2.5MMSCFD COMPRESSED NATURAL GAS (CNG) MOTHER STATION, IKOT OBIO OFFONG,
IBESIKPO ASUTAN L.G.A, AKWA IBOM STATE**

DATE: 29-04-2026

PARAMETERS	NMDPRA LIMIT	AF AG1	AF AG2	AF AG3									
VOC ($\mu\text{g}/\text{m}^3$)	160	0.3	0.3	0.4									
NO _x ($\mu\text{g}/\text{m}^3$)	200	0.0	0.0	0.02									
SO _x ($\mu\text{g}/\text{m}^3$)	125	0.0	0.0	0.01									
CO ($\mu\text{g}/\text{m}^3$)	20	0.7	1.2	1.0									
CO ₂ (ppm)		501.0	528.4	508.0									
CH ₄ ($\mu\text{g}/\text{m}^3$)	NA	<0.01	<0.01	<0.01									
Temperature (°C)	25	28.4	28.8	28.1									
Relative Humidity (%)	NA	62.8	60.1	59.2									
Wind Speed (m/s)	NA	2.3	1.4	0.9									
Wind Direction	NA	SW	SW	SW									
SPM ₁₀ ($\mu\text{g}/\text{m}^3$)	250	2.00	4.00	4.00									
SPM _{2.5} ($\mu\text{g}/\text{m}^3$)	250	2.00	3.00	4.00									
SPM _{10-2.5} ($\mu\text{g}/\text{m}^3$)	250	2.00	3.00	3.00									
Noise Level dB(A)	85	47.1	58.4	61.5									
Time		12:42	12:58	13:05									

AFRIC ENERGY REP'S

 Engr. Idara Sylvester Umoguzang
 DATE & SIGN 29/04/2026

QUATERNARY INT'L REP'S

 Emmanuel Johnson
 DATE & SIGN 29/04/2026

Appendix C.4: Chain of Custody Record — Final Sample Batch Documentation (Quaternary International Company Limited, April 2026)

Appendix D: Stakeholder Engagement Documentation

D.1 Community Town Hall Meetings and Key Informant Interviews

Two town hall meetings held at Ikot Obio Offiong Community Hall, 18–19 March 2026. Facilitated by AfricEnergy CLO and Traditional Ruler's Council. Attendance: 147 community members (men: 78; women: 52; youth: 17) plus Uyo LGA observers. KII conducted with HRH Eteidung Emmanuel

Udoh Ekanem (Traditional Ruler), Mr. Akpan Okon (Community Secretary), and Cllr. Grace Effiong (Ward Councillor) on 17 March 2026. FGDs conducted on 20 March 2026 with Women's Development Association (22 participants) and Youth Development Forum (14 participants).



Plate D.1: Community leaders and Traditional Ruler's Council representatives at the pre-consultation meeting — Ikot Obio Offiong, March 2026. Shows HRH Eteidung Emmanuel Udoh Ekanem (Traditional Ruler) flanked by council members and AfricEnergy team.



Plate D.2: Household socioeconomic surveys and KII conducted during PERA field campaign, April 2026. Left: KII session with community leader. Right: household survey with female respondent and field team (PERA 100-household questionnaire).



Plate D.3: Community Town Hall Meeting — AfricEnergy team presenting the CNG project to Ikot Obio Offiong community members, March 2026 (147 attendees across two sessions)



Plate D.4: Focus Group Discussion — community members engaging with AfricEnergy social specialists on employment commitments, water quality impacts, noise concerns, and community benefit expectations

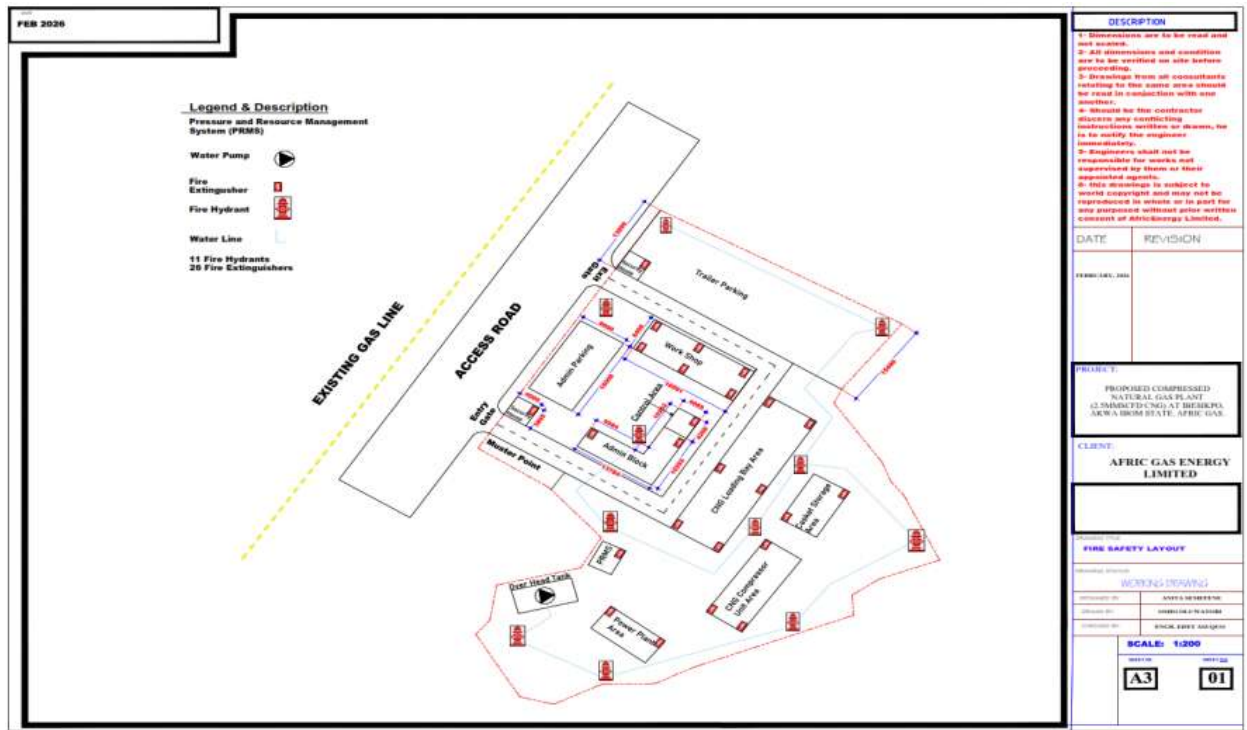


Plate D.5: AfricEnergy environmental and social field survey team at the proposed project site — Ikot Obio Offiong, Ibesikpo Asutan LGA, April 2026

Appendix E: Fire Safety Layout Drawing (Map 4 / Drawing A3-01)

AfricEnergy CNG Gas Energy Limited. Fire Safety Layout. Scale 1:200. Drawing No. A3-01. Date: February 2026. Designed by: Anita Ekempine. Approved by: AfricEnergy Engineering Department.

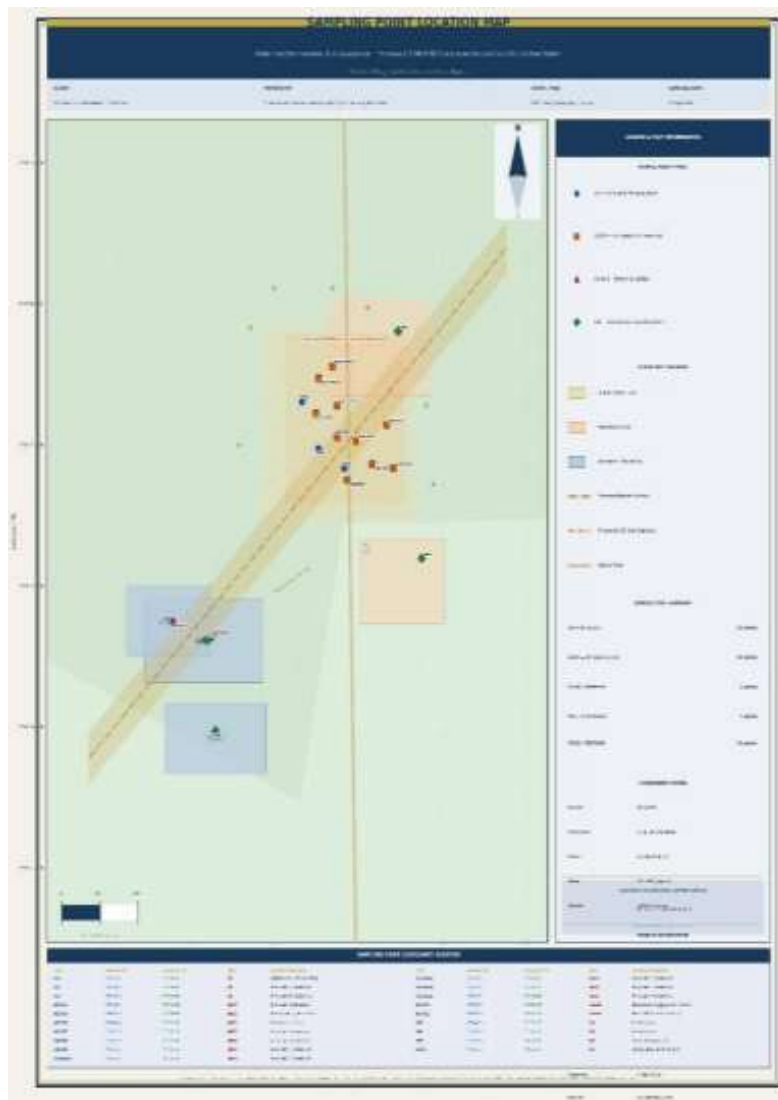
Shows: Gas inlet and PRMS area (northern boundary, adjacent to Savanna Gas Pipeline tie-in); compression system area; CNG cascade storage banks; CNG loading manifolds; trailer filling stations (dual-hose dispensing units); administrative office building with DCS/HMI; maintenance workshop; security gatehouse; trailer parking; internal road network; drainage and stormwater system (oil-water separator); perimeter fencing and CCTV; 11 fire hydrant positions; 20 fire extinguisher positions; PRMS water pump and fire suppression water storage; and emergency assembly point.



Appendix E: AfricEnergy CNG Mother Station — Fire Safety Layout (Scale 1:200, Drawing No. A3-01, February 2026). Designed by Anita Ekempine. All 11 fire hydrant positions, 20 fire extinguisher positions, functional zones, and Savanna Gas Pipeline tie-in are clearly marked.

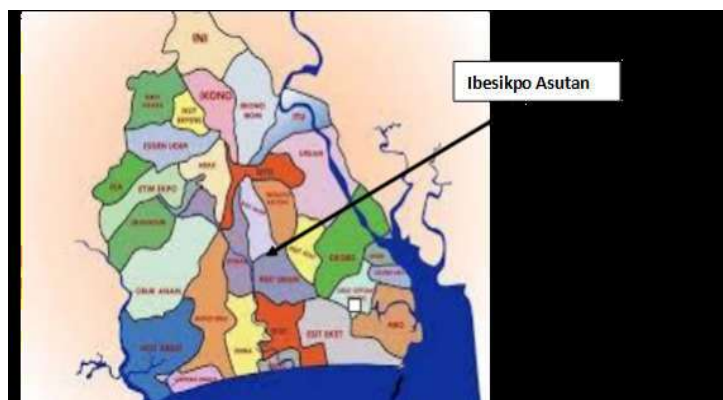
Appendix F: Environmental Sampling Point Location Map (Map 5)

Scale: 1:2,500 (1 cm = approximately 25 m). Date: April 2026. Coordinate System: WGS84. Shows: proposed CNG facility footprint (~4,000 m² direct project area within ~2.5 ha site boundary); 13 air quality/soil sampling stations (AQ1–AQ13); 2 air quality control stations (AQ/SSC1: Savanna Piggling Station; AQ/SSC2: NIPCO Gas Facility); 3 site groundwater boreholes (GW1: 04°56'44.9"N/007°57'05.3"E; GW2: 04°56'39.1"N/007°57'06.3"E; GW3: 04°56'37.0"N/007°56'57.1"E); 1 control borehole (GWC1: 04°56'34.7"N/007°56'57.5"E — near Guelph Gas Limited land); SS soil sampling series; community receptor locations; and Savanna Pipeline tie-in point.

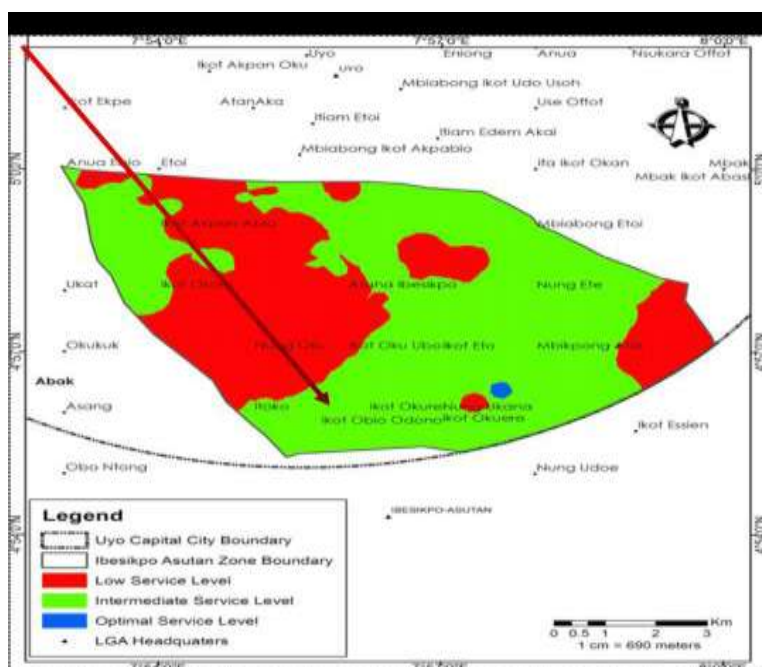


Appendix F: Environmental Baseline Survey Sampling Point Location Map — showing AQ1–AQ13 air quality/soil stations, AQ/SSC1 and AQ/SSC2 control stations, GW1–GW3 site boreholes, GWC1 control borehole (coordinates shown above), SS soil sampling series, community receptor locations R1–R6, and proposed CNG facility footprint. Scale: 1:2,500.

Appendix G: Ibesikpo Asutan LGA Location and Service Level Maps

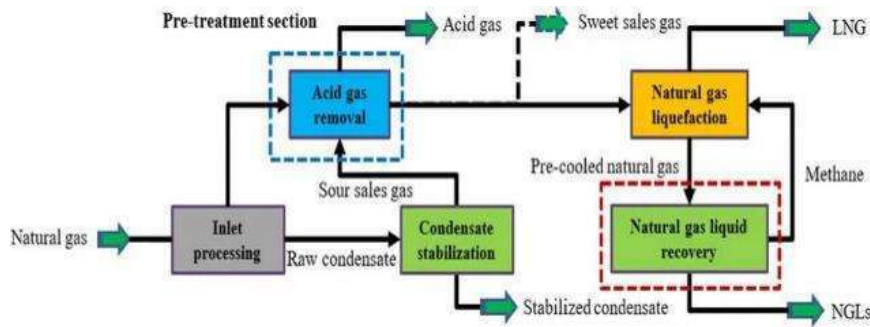


Appendix G.1: Akwa Ibom State LGA Administrative Map — Ibesikpo Asutan LGA (arrowed). Shows all 31 LGAs of Akwa Ibom State with the project LGA identified.

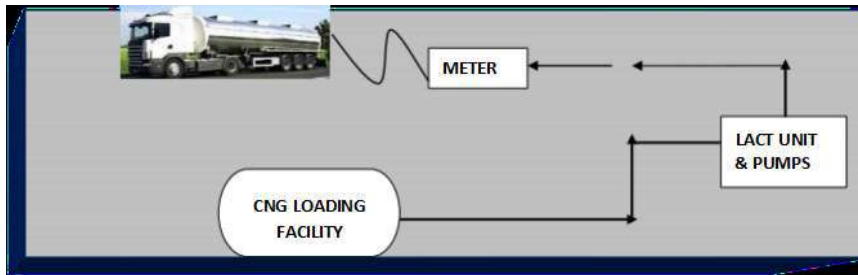


Appendix G.2: Ibesikpo Asutan LGA Service Level Map — Low Service Level (red), Intermediate Service Level (green), Optimal Service Level (blue dot = site location). Scale: 1 cm = 690 m. Source: Akwa Ibom State Spatial Planning Framework. Shows the project site falls within a 'Low Service Level' zone, underscoring the development need.

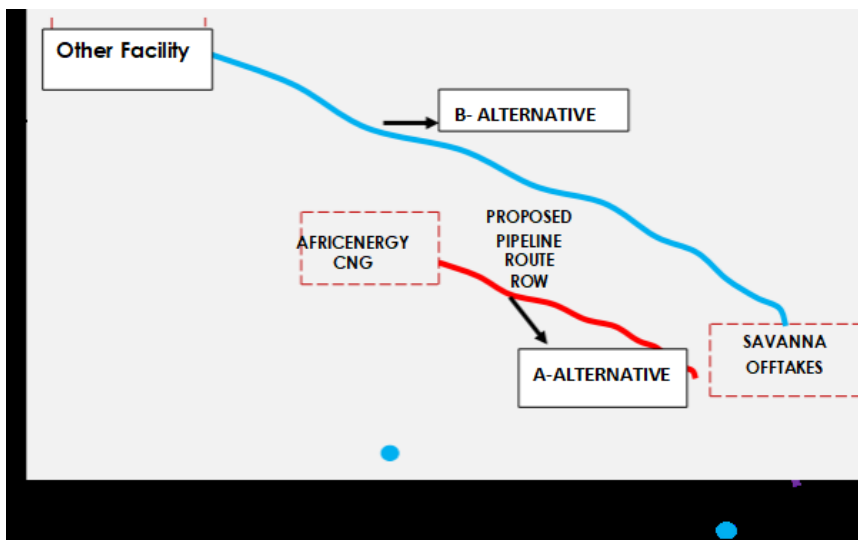
Appendix H: Technical Process Diagrams and Alternative Route Maps



Appendix H.1: Natural Gas Processing Route Schematic — Pre-Treatment Section (inlet processing, acid gas removal, condensate stabilisation), Natural Gas Liquid Recovery pathway, Natural Gas Liquefaction/CNG compression pathway, and product streams (LNG, NGLs, stabilised condensate, sweet sales gas)

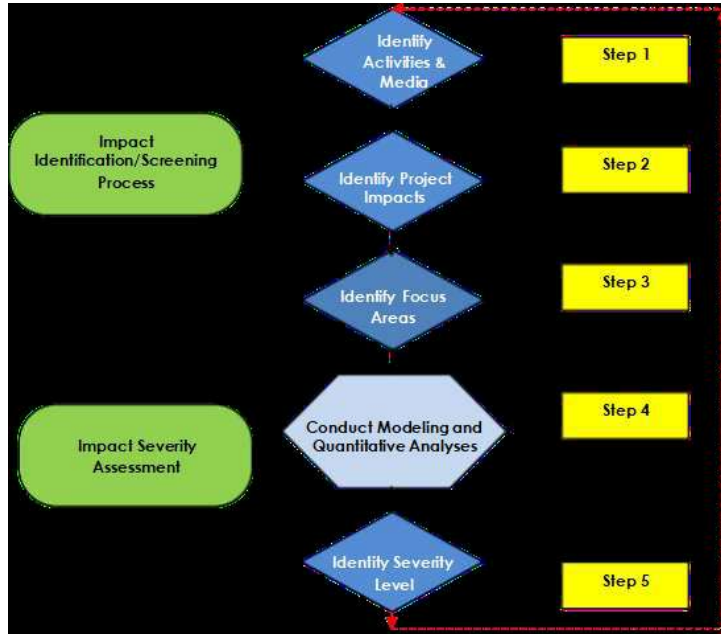


Appendix H.2: CNG Loading Facility Schematic — Tube Trailer (metered), Meter unit, LACT Unit & Pumps, and CNG Loading Facility interconnection diagram (AfricEnergy PERA Report, 2026)

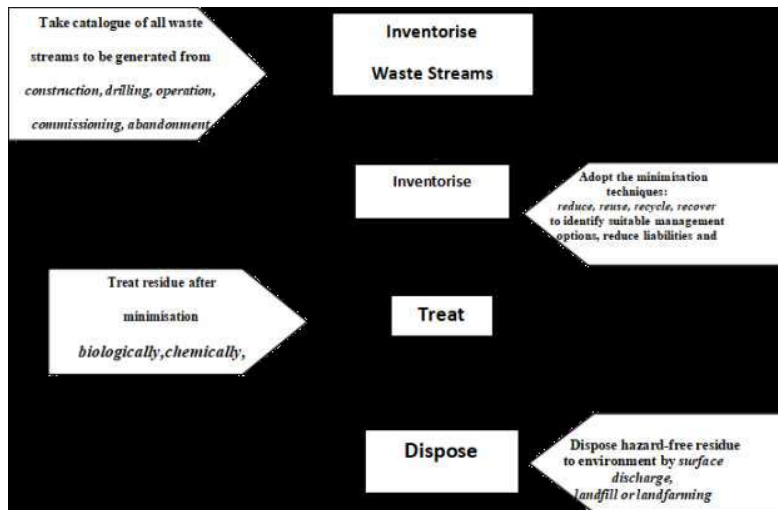


Appendix H.3: Pipeline Route Alternatives Map — Alternative A (Red: Savanna Offtakers to AfricEnergy CNG Plant, ~450 m — SELECTED/PREFERRED)

vs Alternative B (Blue: Other Facility to AfricEnergy CNG Plant, ~3.5 km — NOT PREFERRED).



Appendix H.4: Five-Step Impact Identification and Assessment Process Flowchart — Step 1: Identify Activities and Media; Step 2: Identify Project Impacts; Step 3: Identify Focus Areas (Impact Identification/Screening Process); Step 4: Conduct Modelling and Quantitative Analysis; Step 5: Identify Severity Level (Impact Severity Assessment). Source: AfricEnergy EIA Methodology.



Appendix H.5: Waste Management Hierarchy Diagram — Inventorise Waste Streams (catalogue all waste from construction, drilling, operation, commissioning, abandonment) → Inventorise Minimisation Options (reduce, reuse, recycle, recover) → Treat Residue (biologically, chemically) → Dispose Hazard-Free Residue (surface discharge, landfill, landfarming). Source: AfricEnergy Waste Management Plan.

Appendix I: Community Infrastructure Baseline Photographs (PERA Field Survey, April 2026)



Appendix I.1: Community overhead water storage tank — Ikot Obio Offiong (baseline water supply infrastructure; confirms community reliance on elevated storage tanks and private boreholes rather than piped supply)



Appendix I.2: Community access road during wet season (April 2026) — severe flooding of laterite road surface illustrating baseline drainage and infrastructure deficit; confirms need for Axle Load Management Plan during construction



Appendix I.3: Community Secondary Grammar School, Ikot Essien Ibesikpo, Ibesikpo Asutan LGA — educational infrastructure within 2 km of the project site (baseline documentation, April 2026)



Appendix I.4: Typical community housing stock — block construction with corrugated iron roofing, partially developed compound (baseline documentation, April 2026; confirms 70% 'fairly good' rating from PERA household survey)



Appendix I.5: Rubber tree tapping — representative of the smallholder agro-forestry cash crop activities on the community periphery (Hevea brasiliensis; Ikot Obio Offiong study area, April 2026)



Appendix I.6: Welding and metalwork fabrication — representative of the skilled construction-phase employment opportunities that will be available to local workers (Ikot Obio Offiong area; Nigeria Welders and Fitters Association)